

THE NATIONAL
SHIPBUILDING
RESEARCH
PROGRAM

INDUSTRIAL RELATIONS

FINAL REPORT

U.S. DEPARTMENT OF COMMERCE

Maritime Administration Administration

IN COOPERATION WITH

LEIVINGSTON SHIPBUILDING COMPANY

AND

ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 1981		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The National Shipbuilding Research program Industrial Relations				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128-9500 MacArthur Blvd Bethesda, MD 20817-5700				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 144	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Contract No. - D0-A01-78-00-3036

FINAL REPORT

INDUSTRIAL RELATIONS

INDUSTRIAL RELATIONS

FINAL REPORT

Prepared by:

ACKNOWLEDGEMENTS

Livingston gratefully acknowledges the generous contribution of the IHI Consulting Personnel and all of the IHI personnel in Japan who made this study possible.

Special appreciation is due the following individuals who provided their time and information in the conduct of this study.

Aioi Shipyard

Mr. Fusaji Usami

Mr. Hiroshi Katayama

Mr. Toshio Hukada

Mr. Hiroshi Noguchi

IHI Head Office

Mr. Nobuji Hamada

Mr. Akio Tojima

Mr. Kiyoshi-Kasugai

Mr. Wataru Satow

Mr. Toshio Tomotsune

Mr. Masayuki Endo

Japan Confederation of Shipbuilding & Engineering Workers' Unions

Mr. Hindenobu Kanasugi

Mr. Mikia Nakagawa

And, to Mr. Renzo Yanagisawa, Member of the House of Concillors.

PREFACE

This report is one of several emanating from the Shipbuilding Technology Transfer Program performed by Livingston Shipbuilding Company under a cost sharing contract. with the U.S. Maritime Administration.

The material contained herein was-developed from the study of the Industrial Relations programs and systems presently in-operation in the shipyards of Ishikawajima-Harima Heavy Industries (IHI) of Japan. Information for this study was derived from source documentation supplied by IHI, information obtained directly from IHI consulting personnel assigned on-site at Livingston, and from personal observations by two teams of Livingston personnel of actual operations at various IHI shipyards in Japan.

In order to place this study in context within the. overall Technology Transfer Program, a brief overview of the program and its organization is provided in the following paragraphs:

THE TECHNOLOGY TRANSFER PROGRAM (TTP)

The U.S. shipbuilding industry is well aware of the significant shipbuilding cost differences between the Japanese and ourselves. Many reasons have been offered to explain this differential and whether the reasons are valid or not, the fact remains that Japanese yards are consistently able to offer ships at a price of one-half to two-thirds below U.S. prices.

Seeing this tremendous difference first hand in their own estimate of a bulk carrier slightly modified from the IHI Future 32 class design, Livingston management determined to not only find out why this

was true but to also attempt to determine precise differences between IHI and Livingston engineering and design practices; production planning and control methods; facilities, production processes, methods and techniques; quality assurance methods; and personnel organization, operations and training. The obvious objective of such studies was to identify, examine and implement the Japanese systems, methods and processes which promised a significant improvement in the Livingston design/production process.

With this objective in mind, and recognizing the potential application of the TIT results to the American shipbuilding industry, Livingston initiated a cost-sharing contract with MarAd to provide documentation and industry seminars to reveal program findings and production improvement results measured during production of the bulkers. Subsequently, Livingston subcontracted with IHI Marine Technology Inc. (an American corporation and a subsidiary of IHI, Japan) specifying the areas to be explored and the number and type of IHI consulting personnel required during the period of re-design and initial construction of the first hulker.

Basically, the program is organized into six major tasks:

- 1 - Cost Accounting
- 2- Engineering and Design
- 3- Planning and Production Control
- 4- Facilities and Industrial Engineering
- 5- Quality Assurance
- 6 - Industrial Relations

Beneath each of these major tasks is a series of sub-tasks which further

delineate discrete areas of investigation and study. Each sub-task area has been planned and scheduled to: 1) study IHI systems, methods and techniques; 2) compare the Livingston and IHI practices; 3) identify improvements to the Livingston systems; 4) implement approved changes; 5) document program findings, changes to the Livingston systems, and the results of those changes; and 6) disseminate program findings and results to industry via. MarAd.

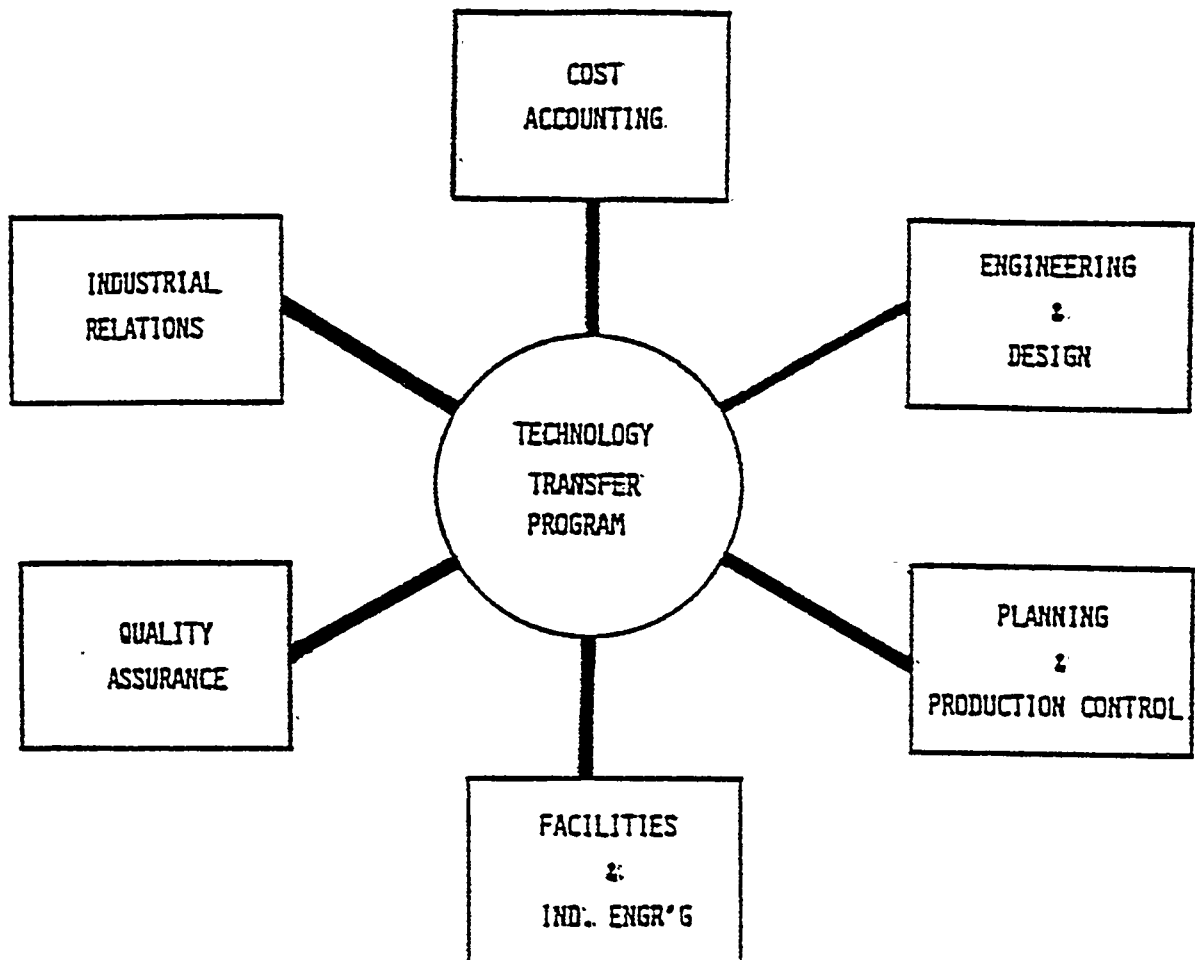


TABLE OF CONTENTS

<u>SECTION</u>	<u>SUBJECT</u>	<u>PAGE NO.</u>
	INTRODUCTION	
1	BASIC ORGANIZATION STRUCTURE	1-1
1.1	IHI Organization	1-1
1.2	Aioi Organization	1-5
1.3	Personnel Distribution & Characteristics	1-10
1.3.1	Educational Levels	1-12
1.3.2	Employee Age Tenure	1-14
1.3.3	Direct/Indirect & Supervisor/Worker Ratios	1-15
1.4	Organization Analysis	1-15
1.4.1'	The Work Group	1-18
1.4.2	Staff Groups	1-20
2	OPERATING PRACTICES	2-1
2.1	Organization & Management Concepts	2-1
2.1.1	The Personnel System As An Element of Production	2-4
2.2	The Lifetime Contract	2-6
2.3	Work Rules	2-9
2.4	Communications	2-9
2.5	Productivity Improvement Programs	2-13
2.5.1	Suggestion Award Program	2-13
2.5.2	Zero Defects Program	2-14
2.5.3	Cost Reduction Program	2-14
2.6	Employee Attitudes	2-15

TABLE OF CONTENTS (Con't)

<u>SECTION</u>	<u>SUBJECT</u>	<u>PAGE NO.</u>
3	PAY RATES	3-1
3.1	Employee Pay Rates	3-1
3.2	Pay Increases	3-2
3.3	Promotion and Lines of Progression	3-3
4	BENEFITS	4-1
4.1	Vacation & Holidays	4-1
4.2	Bonus. Programs	4-1
4.2.1	Congratulatory Bonuses	4-2
4.2.2	Consolatory Bonuses	4-2
4.2.3	Retirement Bonus	4-3
4.3	Insurance	4-4
4.4	Housing and Dormitories	4-4
4.5	Cafeterias and Cmmissaries	4-5
4.6	Travel Allowances	4-6
4.7	Work Clothing	4-6
4.8	Commendation for Long Service	4-6
5	PERSONNEL WELFARE PROGRAMS	5-1
5.1	General	5-1
5.2	Safety and Sanitation	5-1
5.3	Environment	5-3
5.4.	Employee Facilities	5-5
5.5	Medical/Dental Care	5-6
5.5	Employee Relocation	5-7

TABLE OF CONTENTS (Con't)

<u>SECTION</u>	<u>SUBJECT</u>	<u>PAGE NO.</u>
6	MANAGEMENT/LABOR RELATIONS	6-1
6.1	The Management/Labor "Partnership"	6-1
6.2	Structure of Japanese Labor Unions	6-4
6.3	Zosen Juki Roren	6-5
6.4	Negotiations	6-10
6.5	Local Labor Relations	6-11
7	TRAINING	7-1
7.1	General	7-1
7.2	New Employee Training	7-1
7.2.1.	Middle School Graduates	7-2
7.2.2	High School Graduates	7-3
7.2.3	University Graduates	7-3
7.2.4	Other Employees	7-4
7.2.5	Shipyard Training School Courses	7-4
7.3	Continuing Education & Training	7-6
8	LIVINGSTON FINDINGS AND APPLICATIONS	8-1
8.1	Comparison Analysis	8-1
8.1.1	Employee Distribution &. Ratios	8-2
8.1.2	Personnel Training	8-3
8.1.3	Training	8-4
8.1.4	Productivity Improvement Programs	8-5
8.2	Application to American Shipyards	8-5

TABLE OF CONTENTS (Con't)

<u>SECTION</u>	<u>SUBJECT</u>	<u>PAGE NO:</u>
<u>APPENDICES</u>		
A	Examples of IHI Work Rules	A-1
B.	Comparison Analysis - IHI vs. LSCo.	B-1

LIST OF ILLUSTRATIONS

<u>FIGURE N O .</u>	<u>TITLE</u>	<u>PAGE NC</u>
1-1	Ishikawajima-Harima Heavy Industries Co., Ltd (as of May 1, 1979)	1-2
1-2	Head Office - Shipyard Relationships	1-4
1-3	Total Number of Employees by Organization & Function	1-6
1-4	Aioi District Organization	1-7
1-5	Shipbuilding/Repair Organization	1-8
1-6	Description of Each Section or Group	1-9
1-7	Employee List (for Shipbuilding Only at Aioi)	1-11
1-8	Distribution of Staff for each Section - Aioi Shipyard	1-22
6-1	Structure of Labor Unions Movement in Japan	6-4
6-2	Diagram of Labor Relations	6-6
6-3	Types of Management- - Labor Conference	6-7
7-1	Typical Welder Training Schedule	7-5
7-2	Typical Training for Inspectors & Quality Control Engineers (High School Graduates)	7-7

LIST OF ILLUSTRATIONS (Con't)

<u>FIGURE No.</u>	<u>TITLE</u>	<u>PAGE NO.</u>
7-3	Employees Capability Development Program Field (Production) Personnel	7-8
7-4	Employees Capability Development Program Office & Technical Personnel	7-9

LIST OF TABLES

B-1	Employee. Distribution	B-5
B-2	Employee Ratios	B-10
B-3	Age, Tenure & Education	B-12
B-4	Wages	B-15
B-5	Benefits	B-17
B-6	Welfare	B-19
B-7	Labor Relations	B-22
B-8	Incentives	B-24
B-9	Training	B-26

INTROOUCTION

PURPOSE AND SCOPE

The purpose of this study was to analyze the Japanese (IHI) practices concerning Industrial Relations and their application in the actual working environment in IHI shipyards. As in the many other areas of study within the Technology Transfer Program (TIT) the objective of this study was to define possible beneficial and cost-saving elements or methodologies which could be instituted in Livingston and in other medium size shipyards in the United States.

In this examination of the IHI Industrial Relations practices all aspects of the personnel system, its organization, operating practices, wage structure, personnel benefits, management/labor relations and training were studied and evaluated for possible application to Livingston and to the U.S. shipbuilding industry. The various sections within this report detail those findings and conclusions.

ORGANIZATION OF REPORT

This report is contained in this single volume comprising the Sections listed below:

- Section 1 - Basic Organization Structure
- Section 2 -Operating Practices
- Section 3 - Pay Rates
- Section 4 - Benefits
- Section 5 - Personnel Welfare Programs
- Section 6 -Management/Labor Relations
- Section 7 - Training
- Section 8 - Livingston Findings & Applications

Sections 1 through 7 detail the IHI Industrial Relations system whereas Section 8 provides a comparison between current Livingston practices and those of IHI. Section 8 also presents a discussion of the possible application of the IHI practices to US. shipyards.

Two appendices are also included in this volume: Appendix A - samples of IHI Work Rules; and Appendix B -Comparison Analysis IHI vs LSCo.

REFERENCES

Throughout this report. references are made to other reports produced by Livingston, resulting from the Technology Transfer Program. A list of these reports is presented below.

<u>REPORT</u>	<u>REPORT NO.</u>	<u>DATE ISSUED</u>
Final Report -Quality Assurance	2123-5.1-4-1.	3/3/80
Final Report- Design & Engineering	2123-2.0-4-1	*
Final Report- Planning & Production Control	2123-3.0-4-1	*
Final Report - Facilities & Industrial Engineering	2123-4.0-4-1	*

* - Not issued as of the date of this report.

SECTION 1
BASIC ORGANIZATION STRUCTURE

1.1 IHI ORGANIZATION

Ishikawajima-Harima Heavy Industries Co., Ltd. (IHI) is a large multi-company corporation involved in the manufacture of heavy industrial equipment, processing plants, and ships. The corporation maintains operations throughout the world although its headquarters and the majority of its manufacturing capability resides in Japan.

Since this report is primarily concerned with the shipbuilding companies and activities of IHI, only a cursory overview of the parent corporation is presented here. This overview is however, necessary to the understanding of the shipbuilding activities and the Industrial Relations aspects of these activities.

Figure 1-1 illustrates the top-level organization of IHI. Each of the shipyards contained within IHI are shown as individual functions operating autonomously but under the headquarters direction of the Managing Director of Production. Many of the other organizations shown support the shipbuilding functions. In all, IHI comprises six shipyards in addition to its numerous other companies. The shipyards of IHI. are: Tokyo Shipbuilding and Crane Works; Yokohama No. 1 Works; Nagoya Works; Chits Works; Aioi Shipbuilding and Boiler Works; and Kure Shipbuilding and Fabricated Structure Works.

The IHI shipyards are all organized and operated identically except for minor variations necessitated by geographical peculiarities and facility constraints. A conscious effort to standardize operations

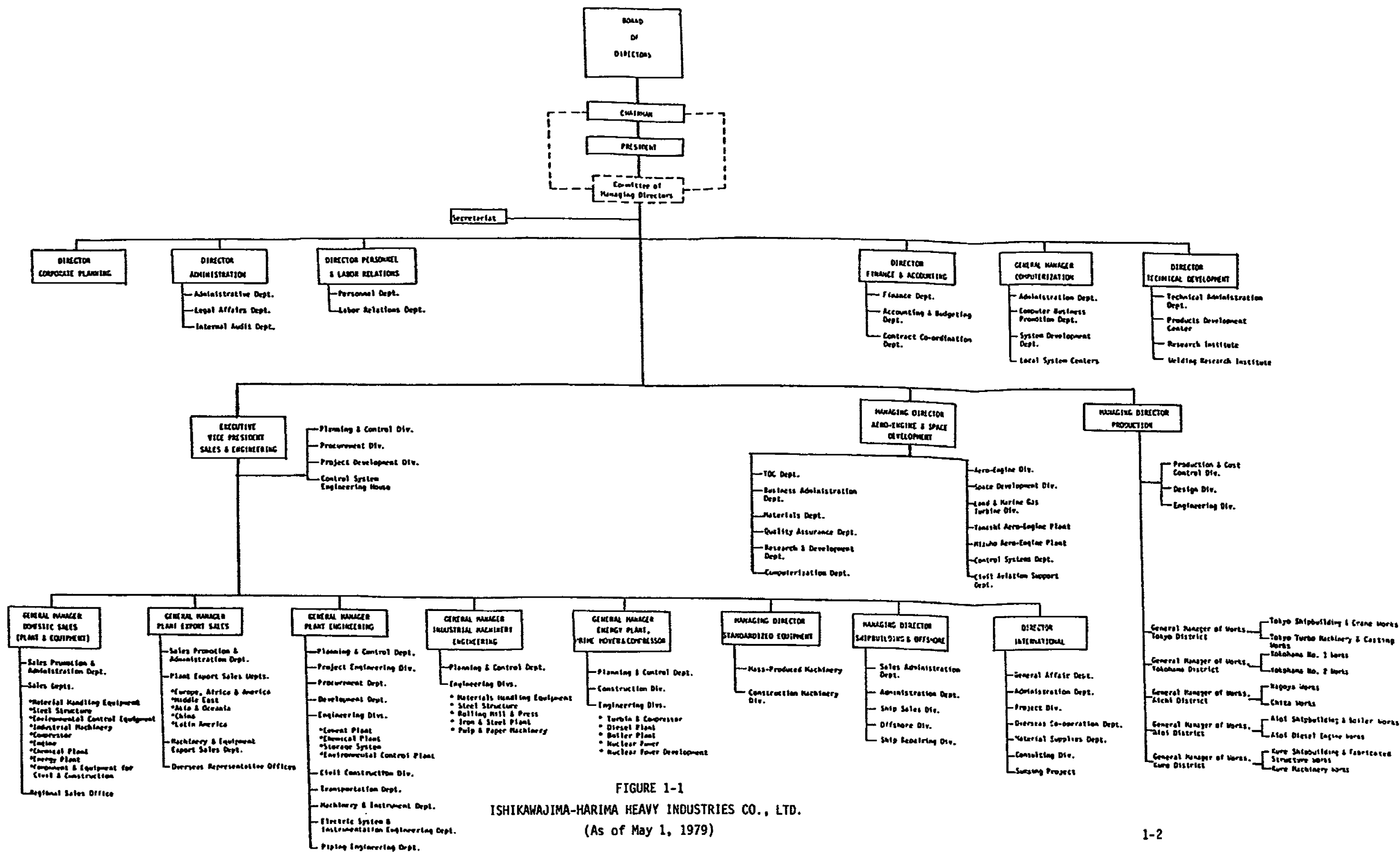


FIGURE 1-1
ISHIKAWAJIMA-HARIMA HEAVY INDUSTRIES CO., LTD.
(As of May 1, 1979)

has been accomplished over the past several years. This standardization has been accomplished through the establishment of common policy, systems and procedures throughout the shipbuilding elements of the corporation. Because of this standardization it is possible to use one yard as the typical example for discussion of yard organization, functions and responsibilities, and operations and practices. characteristic of IHI shipyards. The yard selected as this example is the Aioi Shipyard located on the South-western coast of Japan. Many references are made herein to this yard.

Within IHI, the corporate office (Head Office) is responsible for all ship sales and for the establishment of the "Basic Design" (i.e. specifications and top-level ship design lay-outs including unfaired ship's lines, general arrangement and machinery arrangement plans, etc). Delivery schedules are also established by the Head Office after consultation with the yard selected for the construction program. Essentially, the Head Office controls the distribution of work to all of its six yards and is responsible for all marketing activities for these yards.

Many of the corporate groups contribute to the internal and external support of the shipyards and almost all of these groups maintain a direct interface with shipyard counterparts in their respective areas of responsibility. Figure 1-2 shows the typical interrelation of the Tokyo Head Office activities with the shipyards.

As of July 1979 IHI employed 27,340 persons of which 1,706 were engaged in Head Office activities. Of major importance to the shipbuilding elements of the corporation are the Head Office personnel

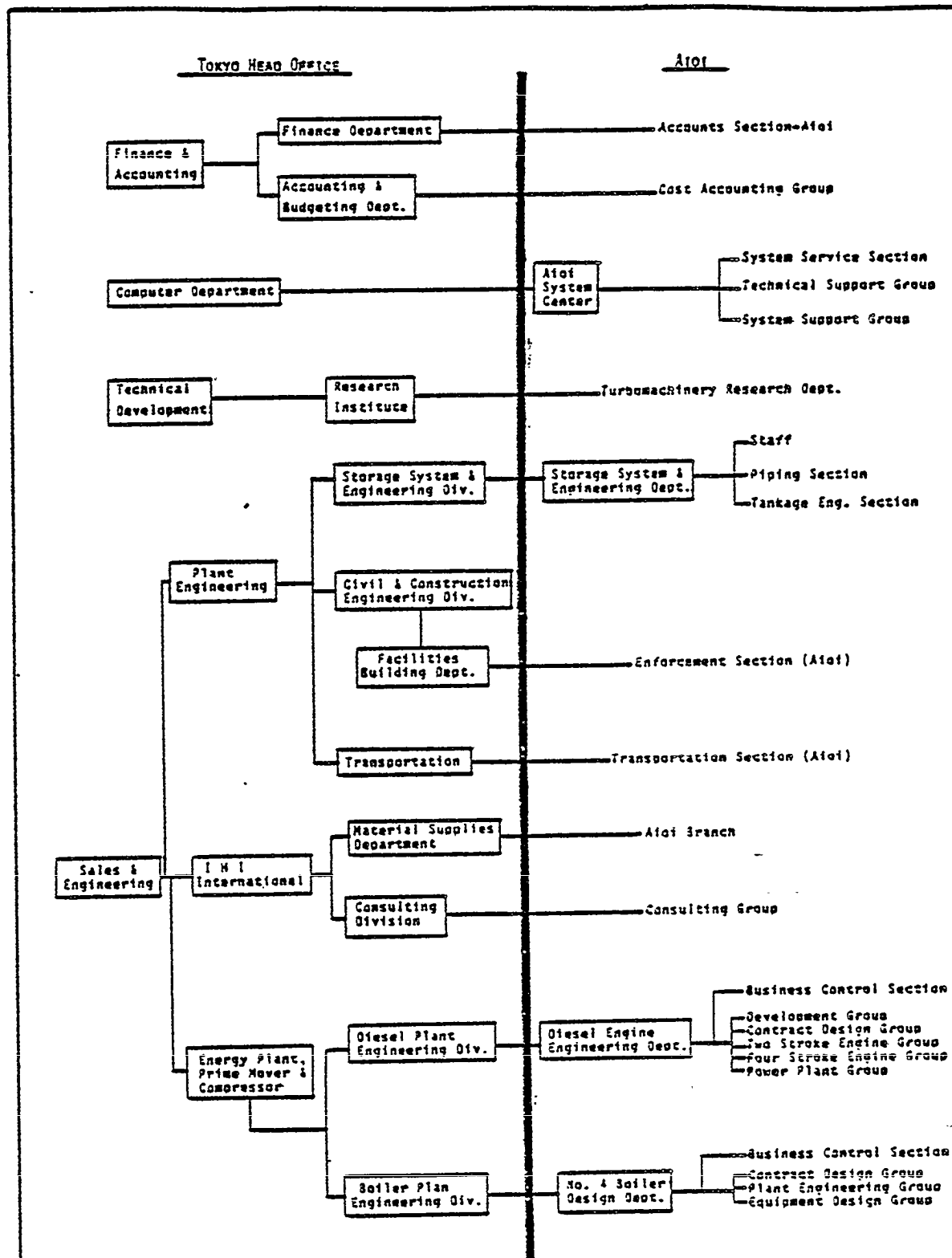


FIGURE 1-2

HEAD OFFICE - SHIPYARD RELATIONSHIPS

dedicated to sales activity (85), design (976), and production Division management (23). Figure 1-3 presents a breakdown of the total number of IHL employees by organization and function as of July 1979.

1.2 AIOI ORGANIZATION

Basically the IHI Aioi District (yard) is organized into two major divisions, designated No. Land No. 2 Works, each headed by a General Superintendent. Each division is further divided into two activities as follows: No. 1 Works - Boiler Works and Shipbuilding; No. 2 Works - Foundry Works and Diesel Works. These activities represent the total functions and product lines of Aioi.

IHI is licensed to build both Sulzer and Pielstick diesel engines and the No. 2 Works at Aioi is primarily concerned with these products. The Boiler Works builds boilers for steam power plants both for land installations and for main engines for ships.

The organizational structure of shipbuilding at Aioi is shown in Figures 1-4 and 1-5. A description of the responsibilities of each department and group is provided in Figure 1-6.

Supplementing the IHI organization are approximately 35 subcontractors located immediately adjacent to the yard.

The City of Aioi has a population of 42,000 of which 6500 work for IHI and approximately 6000 to 6500 for subcontractors who, in fact, are an extension of the yard work-force. Hence some 12,000 people directly earn a living from the yard.

Aioi is a single industry city, literally a city built around the IHI Aioi Works. This single fact has many far-reaching implications concerning personnel work attitudes, mobility of the workforce (both internally and externally), the high productivity levels and the

FUNCTION \ DEPT		SALES & ENGINEERING	PRODUCTION	AERO ENGINE & SPACE DEPT.	HEAD OFFICE	TOTAL
ADMINISTRATIVE	CORPORATE PLANNING & RESEARCH	45	7	0	18	70
	ADMINISTRATION & SECRETARIAT	31	425	37	173	666
	PERSONNEL & LABOR RELATIONS	14	423	73	87	597
	ESTIMATION & COST CONTROL	276	0	55	0	331
	PROCUREMENT	326	435	118	0	879
	TECHNICAL ADMINISTRATION	172	410	238	74	894
	PRODUCTION CONTROL	57	324	195	5	581
	QUALITY CONTROL	190	485	330	0	1,005
	MAINTENANCE	9	544	74	0	627
	SERVICE	167	27	22	0	216
	FINANCE & ACCOUNTING	0	84	0	197	281
	COMPUTER	0	0	20	486	506
	CONTROL OF SUBSIDIARY COMPANY	25	0	0	0	25
	TECHNICAL & RESEARCH	292	0	125	633	1,050
	MANAGEMENT	64	11	3	10	88
	SUB-TOTAL	1,668	3,175	1,290	1,683	7,816
SALES	DOMESTIC SALES	401	35	67	0	503
	DOMESTIC SALES OFFICE	383	0	0	0	383
	EXPORT	237	0	0	0	237
	FOREIGN SALES OFFICE	64	0	0	0	64
	MANAGEMENT	210	50	0	0	260
	SUB-TOTAL	1,295	85	67	0	1,447
DESIGN	DESIGN	3,223	900	162	0	4,285
	MANAGEMENT	161	76	0	0	237
	SUB-TOTAL	3,384	976	162	0	4,522
PROD.	PRODUCTION	0	11,071	1,178	21	12,270
	CONSTRUCTION OPERATION, FITTING	309	0	0	0	309
	MANAGEMENT	0	963	11	2	976
	SUB-TOTAL	309	12,034	1,189	23	13,355
GRAND TOTAL		6,656	16,270	2,708	1,706	27,340

FIGURE 1-3

TOTAL NUMBER OF EMPLOYEES BY ORGANIZATION & FUNCTION

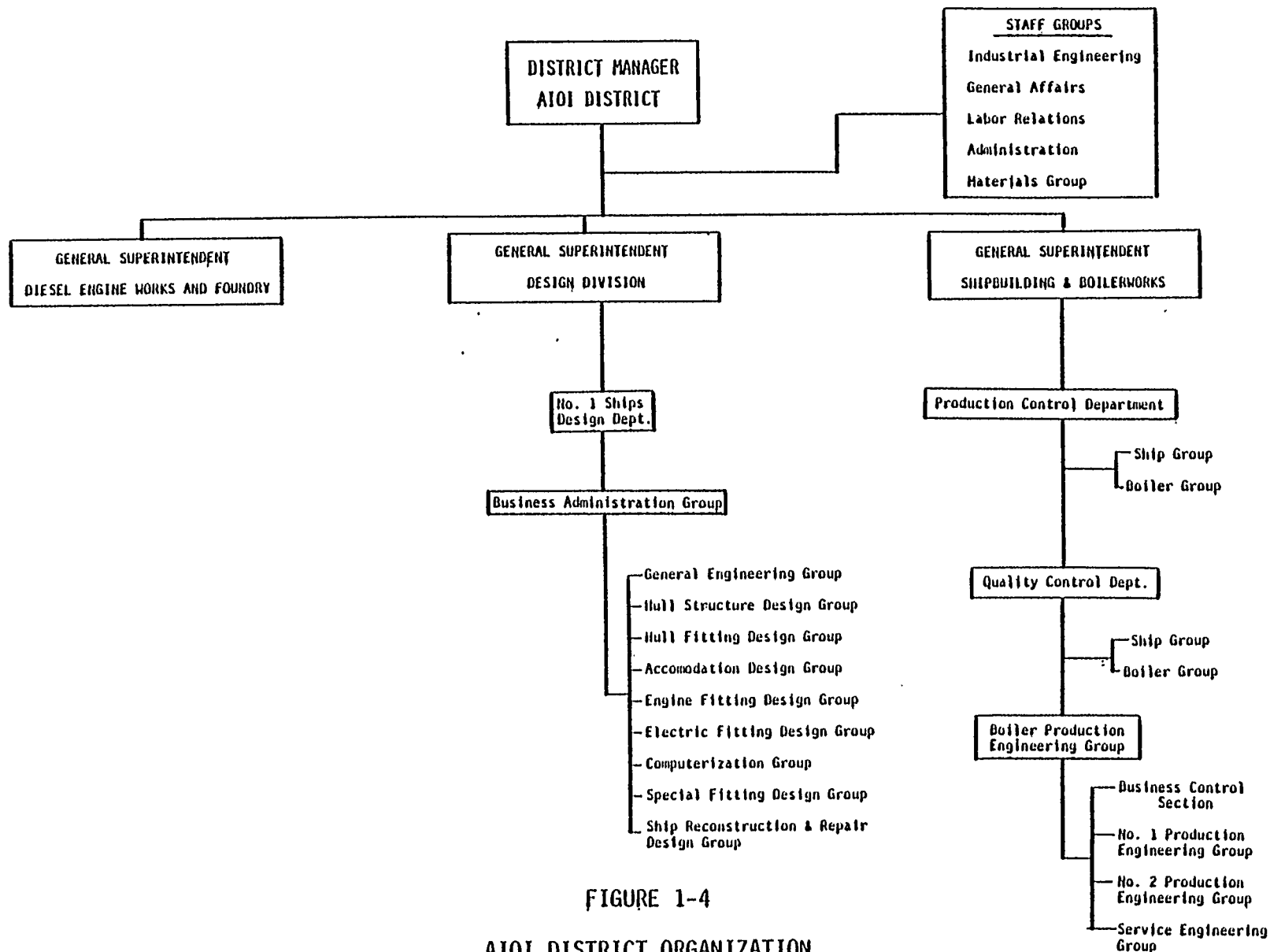


FIGURE 1-4

AIOI DISTRICT ORGANIZATION

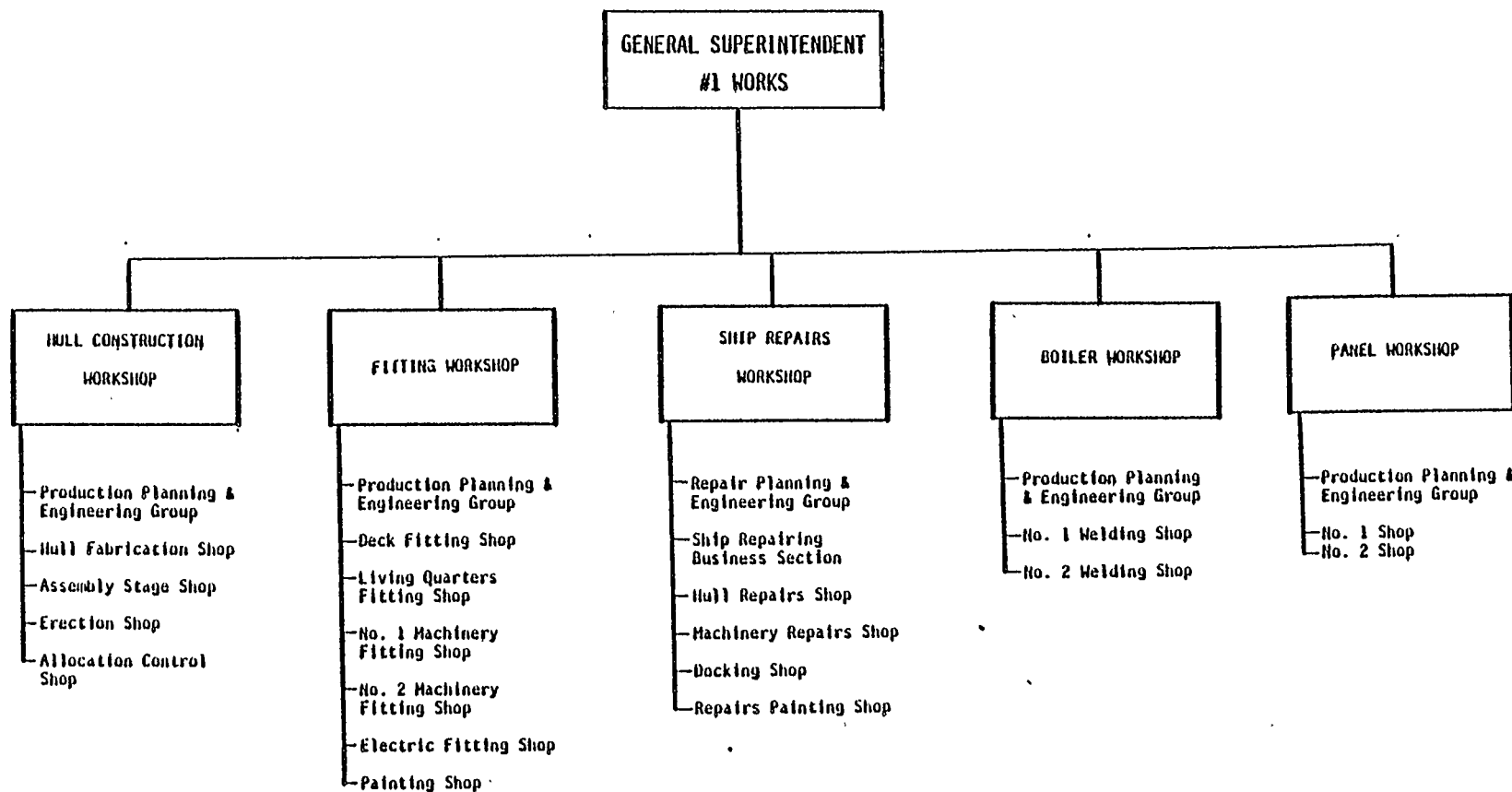


FIGURE 1-5

LABOR RELATION DEPARTMENT

- 1) New employee hiring, personnel changes, personnel evaluation, personnel management and private affairs consultation for workers.

LABOR RELATIONS SECTION:

- 2) Education and training for workers.
- 3) Salary administration.
- 4) Personnel welfare programs.

SAFETY AND SANITATION SECTION:

- 5) Check of actual conditions, planning and leadership for safety and sanitation including sub-contractor personnel in the yard.

GENERAL AFFAIRS DEPARTMENT

SALES BUSINESS SECTION:

- 1) After contract of new ships, general sales business, contact with resident superintendents and preparation of documents relating to ships construction.
- 2) Incidental business for new ships sales.
- 3) Control for superintendent office and accommodation.
- 4) Control of fixed property in Aioi Shipyard.

ENVIRONMENTAL CONTROL GROUP:

- 1) Periodic check and control for sewage in Aioi Shipyard.

ADMINISTRATION DEPARTMENT

ADMINISTRATION GROUP:

- 3) General administration and accounting.

MAINTENANCE & POWER GROUP:

- 1) Operation, maintenance and control of electric power, fresh water, sea water, compressed air and steam supply.
- 2) Control and operation of industrial gases and maintenance of main supply line in Aioi Works.
- 3) Planning and study for improvement of electric and heat power sources.

MATERIAL DEPARTMENT

PURCHASING GROUP:

- 1) Purchase and price determination of materials and equipment from manufacturers/makers.
- 2) Setting of delivery dates for materials and delivery control.
- 3) Technical instruction of manufacturers in quality control of materials manufactured outside the yard.

WAREHOUSE GROUP:

- 1) Receipt inspection and stock issue control for all materials and equipment.
- 2) Planning and control of stock materials in the yard warehouse.

ALLOCATION CONTROL GROUP:

- 1) Scheduling and operation of all yard cranes.
- 2) Scheduling and operation of all yard transportation equipment.
- 3) Scheduling and setups of all scaffolding used throughout the yard.

SHIPS DESIGN DEPARTMENT, SHIPS DESIGN OFFICE

BUSINESS ADMINISTRATION GROUP:

- 1) General service for each design section
- 2) Drawing schedules
- 3) Working schedules
- 4) Estimations
- 5) Drawing Release

GENERAL ENGINEERING GROUP:

- 1) Administration of each design group
- 2) Calculation on the properties of ship
- 3) Tonnage measurement
- 4) Consultant work for overseas shipyard (Drawing supply)
- 5) Design of repair works

HULL STRUCTURE DESIGN GROUP:

- 1) Key plan of hull fittings and piping
- 2) Yard plans of hull structure
- 3) Block arrangement
- 4) List of hull structure members including weight and length of fillet weld

HULL FITTING DESIGN GROUP:

- 1) Key plan of fittings and piping
- 2) Purchase order specifications
- 3) Fitting arrangement plans
- 4) Production drawings of hull piping and outfitting
- 5) Material Lists and Piece Drawings
- 6) Inputs to Purchase Order Specifications

ACCOMMODATION DESIGN GROUP:

- 1) Key plan of accommodation quarters
- 2) Joiner Arrangement
- 3) List of upholsteries and fittings
- 4) Purchase order specifications
- 5) Production drawings of accommodation quarters
- 6) Input to Material Lists and piece drawings
- 7) Key plan and yard plan of superstructure

ENGINE FITTING DESIGN GROUP:

- 1) Machinery arrangement
- 2) Piping diagram of engine room
- 3) Purchase order specifications
- 4) Sea trials
- 5) Production drawings of engine room
- 6) Funnel fittings
- 7) Tanks and auxiliary seats

ELECTRIC FITTING DESIGN GROUP:

- 1) Wiring diagrams

- 2) Purchase order specifications

- 3) Electric fitting arrangements

- 4) Equipment for lighting and cable installation

COMPUTER GROUP:

- 1) Development of system and program for computer
- 2) Maintenance of manual for computer programs
- 3) Standardization of miscellaneous fittings

SPECIAL FITTING DESIGN GROUP:

- 1) Design of cargo gears and hatch covers
- 2) Car deck for car carriers
- 3) Ramp way stern and bow door for RO/RO ships
- 4) Purchase order specification

PRODUCTION CONTROL DEPARTMENT:

PRODUCTION CONTROL SHIP GROUP:

- 1) Overall planning for all works in Aioi Shipyard such as estimates and budgets for ships construction including tools and inventories.
- 2) Manpower planning for total shipyard.
- 3) Preparation of overall program management data.

DOCK MASTERS GROUP:

- 1) Control and command of ships operation during sea trial, docking and undocking, mooring and unmooring.

QUALITY CONTROL DEPARTMENT:

SHIPS GROUP:

- 1) Planning and control of inspection schedules of each ship.
- 2) Recording and final decision of inspection results in hull construction, materials and equipments.
- 3) Recording of information related to departments/sections for technical matters required by superintendents and classification surveyors.
- 4) Issue of inspection application to the resident inspectors and surveyors.
- 5) Preparation and follow-up of inspection standards and other general affairs of inspection.
- 6) Collection of data and study of technical problems for delivered ships.
- 7) Control and dispatch of guarantee engineers and/or service engineers to the delivered ships.

HULL CONSTRUCTION WORKSHOP:

PRODUCTION PLANNING AND ENGINEERING GROUP:

- 1) Planning and control of hull construction schedule and total manhours in Hull Construction Workshop.

- 2) Collection and analysis of accuracy data issued from each section of Hull Construction Workshop.

- 3) Planning and engineering for hull construction practices and methods.

- 4) Safety control throughout hull construction.

- 5) Management of Job Training School and testing for certification for welders.

- 6) Other general affairs in Hull Construction Workshop.

HULL FABRICATION SHOP:

- 1) Planning and control of mold loft work and fabrication works.
- 2) Accuracy control for the above work.
- 3) Fabrication of Hull parts and pieces sub-assembly work.

ASSEMBLY STAGE SHOP:

- 1) Planning and control of ground assembly for hull construction.
- 2) Accuracy control of the above work.
- 3) Assembly work.

ERECTION SHOP:

- 1) Planning and control of erection work for hull construction.
- 2) Planning and preparation for launching.
- 3) Accuracy control of the above work.
- 4) Erection work.

ALLOCATION CONTROL SHOP:

- 1) Planning and control of allocation and transportation for hull blocks, unit fittings and equipments.
- 2) Planning and control of scaffolding for ship construction including fitting works.
- 3) Operation of cranes and transports.
- 4) Erection of scaffolding.

FITTING WORKSHOP:

PRODUCTION PLANNING AND ENGINEERING GROUP:

- 1) Planning and control of hull fitting schedule and total manhours in Fitting Workshop.
- 2) Planning and engineering of hull fitting practice and method.
- 3) Safety control throughout hull fitting work.
- 4) Other general affairs in Fitting Workshop.

DECK FITTING SHOP:

- 1) Planning and control of ground assembly, unit assembly and assembly onboard for deck fittings.
- 2) Planning and demonstration testing of onboard deck fittings.
- 3) Accuracy control for deck fitting work.
- 4) All fitting work.

FIGURE 1-6
DESCRIPTION OF EACH SECTION OR GROUP

responsibilities of the company to the community. These are discussed in detail in later sections of this report.

The Aioi District was recently reorganized (in 1978) to better reflect the several product areas and to clearly separate the functions and personnel of each area. The division into No. 1 and No. 2 works illustrates this product alignment. This division is specifically oriented around production functions with Sales and Engineering support provided by the IHI Head Office in Tokyo.

Also in this division of product lines was the distinction of primary "welding" activities as opposed to "machining" operations. The No. 1 Works (i.e. Shipbuilding and Boiler Works) is considered primarily as a welding operation, while the No. 2 Works (i.e. Foundry and Diesel Works) is considered a machining operation. This alignment of product line operations provides for a high degree of concentration of personnel, equipment, and facility resources in each product area. Insofar as possible every attempt is made to maintain this separation of activity.

1.3 PERSONNEL DISTRIBUTION & CHARACTERISTICS

Of the total IHI employment of 27,340 personnel in July 1979, the six IHI shipyards accounted for 11,272 or 41 percent of this total.

Within Aioi Shipyard 3243 employees are involved in shipbuilding and ship repair activities. Figure 1-7 provides a breakdown of personnel by organization within Aioi. Support personnel are also shown in the figure, however, these personnel are not exclusively dedicated to the shipbuilding activities in Aioi. The "indirect" personnel numbers identified in the figure do not accurately reflect the total number of

NAME OF DEPARTMENT SHOP & GROUP		MANAGER	STAFF	FOREMAN	INDIRECT FIELD WORKER		DIRECT FIELD WORKER		TOTAL
					ASST. FOREMAN	WORKER	ASST. FOREMAN	WORKER	
STAFF	GENERAL SUPERINTENDENT	2							2
	COCKMASTER GROUP	2	1						3
	SAFETY AND SANITATION GROUP	1	8	3					12
	PRODUCTION CONTROL DEPT. SHIP'S GROUP	1	6						7
	QUALITY CONTROL DEPT. SHIP'S GROUP	5	28						43
HULL CONSTR. WORKSHOP	PRODUCTION PLAN. & ENGR'G GROUP	4	20	3		3	9	53	92
	HULL FABRICATION SHOP	1	6	7	1	4	27	210	256
	ASSEMBLY STAGE SHOP		5	6	0	0	25	228	265
	ERECTION SHOP	1	4	9	1	4	43	280	342
	ALLOCATION CONTROL GROUP	1	5	8	6	14	16	148	198
	TOTAL	7	40	23	8	25	120	919	1,153
FITTING WORKSHOP	PRODUCTION PLAN. & ENGR'G GROUP	4	11	1	3	8	0	2	29
	DECK FITTING SHOP	1	8	8	1	2	25	122	167
	LIVING QUARTER FITTING SHOP	1	4	8	1	0	23	131	168
	NO. 1 MACHINERY FITTING SHOP	1	5	6	1	1	18	27	119
	NO. 2 MACHINERY FITTING SHOP	1	6	4	0	0	10	37	58
	ELECTRIC FITTING SHOP	1	9	4	0	0	19	91	124
	PAINTING SHOP	1	10	5	0	1	13	50	80
	TOTAL	10	53	36	6	12	108	510	745
SHIP REPAIR WORKSHOP	REPAIR PLANNING & ENGINEERING GROUP	5	16	2	1	7	1	14	46
	SHIP REPAIR BUSINESS SECTION	1	10						11
	HULL REPAIRS SHOP	1	9	9			55	240	315
	MACHINERY REPAIRS SHOP	1	10	9			29	189	238
	DOCKING SHOP	1	3	6			21	109	140
	REPAIRS PAINTING SHOP	1	3	2			7	22	34
	TOTAL	10	51	28	1	7	112	574	784
	GRAND TOTAL	38	196	101	15	44	341	2,013	2,749
ADMIN. GROUP	SALES BUSINESS SHIP'S GROUP	2	12			1			15
	LABOR RELATION SHIP'S GROUP	1	10						11
	MAINTENANCE & POWER GROUP	2	20	3	5	3	2	41	76
MATERIAL GROUP	PURCHASING SHIP'S GROUP	1	20						21
	MATERIAL CONTROL SHIP'S GROUP	1	15		9			25	51

FIGURE 1-7
EMPLOYEE LIST
(For Shipbuilding Only At Aioi)

"indirect" personnel. In addition to those shown, all managers, staff and foremen are considered "indirect". The manhours of these indirect personnel are spread over all hulls in production at any given time. Only the direct personnel shown are charged to a particular hull. Spreading this "indirect" pool of manhours across the workload of the shipyard allows a relatively even distribution of manhours against all hulls in production. This helps to keep the number of direct manhours charged against a particular hull at a predictable limit and keeps the cost and the manhours in some direct proportion from vessel to vessel.

1.3.1 Educational Levels

Education in Japan is extremely uniform through the first 12 years (i.e. high school). So much so in fact, that until the past few years curricula and schedules were identical throughout the country. Presently, minor variations occur between different locales due to the advent of local school boards and administration. However, for the most part, education throughout Japan still follows a standard approach and curriculum for all students.

This intense standardization provides a common educational base for all Japanese workers in all industries. It also allows an excellent means of evaluation and stratification of employees by virtue of the number of years one has spent in school. Under this educational system it is possible to know precisely what subjects have been completed and the depth of those subjects by simply knowing how many years of schooling an employee has had. Further, this common education allows a high degree of mutual understanding and communication between all personnel since they have all studied the same subjects at

approximately the same time in their schooling. Hence, high school graduates have essentially the same basis in knowledge and understanding and can communicate on a relatively common level.

Universities have far more latitude and diversification. However, specific courses (e.g. marine engineering), are fairly well standardized among all universities.

At present it is mandatory for all children to graduate from Junior High School . Approximately 90 percent of all children at least enter High School and about a third of these go on to higher (university level) schooling.

The result of this educational standardization is a populace almost 100 percent literate, and well schooled in basic language, mathematics, and the physical sciences.

In the present Japanese society formal education is the criterion upon which one's function and status is determined. Career, wages and status are all dependent upon the extent of education received. Hence, in any industrial organization the holders of the highest university degrees are usually at the top of the organization, those holding the equivalent of America's Bachelor's degrees are usually in middle-level management or staff positions, High School graduates are in line supervision, and Junior High School graduates are at the worker level.

This stratification provides a system of progressively greater technical knowledge from the lowest organizational levels to the highest and, as a consequence, wages are regulated on the basis of years of schooling and degrees achieved.

In the typical IHI shipyard, all District Managers and General

Superintendents have Naval Architecture or Marine Engineering degrees. All shipyard managers, workshop staff personnel, and, of course, all Engineers, have engineering degrees from national or private universities. Although many of the middle and upper management personnel may have identical degrees, usually upper management has obtained degrees from the top-rated universities.

Exceptions to this typical pattern do occur, when an exceptional person is elevated to a position exceeding his educational status; as a general rule, however, Japanese industry follows this basic pattern.

1.3.2 Employee Age and Tenure

Data supplied by the Japan Confederation of Shipbuilding and Engineering Workers shows that in June 1979, of the 204,800 workers represented, the average age was 35.8 years and the length of service (with a single company) was 13.7 years. This is due somewhat to the fact that since the serious recession in shipbuilding began in 1975-76 all Japanese shipyards have reduced capacity and workforce by 30 to 50 percent. The reduction of the workforce was accomplished through voluntary retirement and a cessation of hiring. Therefore, few if any new employees have been added to the workforce in the past several years.

In the IHI Aioi yard the average age of employees was 37 (in July 1979) and the average length of service with the shipyard was between 15 and 18 years. This maturity and tenure of the workforce accounts for much of the stability of the IHI production system. The skill level of individual workers is extremely high as is their familiarity with the planning and production system.

1.3.3 Direct/Indirect and Supervision/Worker Ratios

As mentioned previously, IHI designates many more employees as "indirect" than do U.S. yards. In July 1979 the ratio of indirect to direct workers was 1 to 4.4. These numbers include indirect workers as well as all members of management and supervision. The ratio of supervision (i.e. managers and foremen) to workers during this same period was 1 to 4.5.

Out of the total of 3,243 personnel at AIOI shipyard, 2,128 were classified as workers. Managers, staff personnel, foremen and assistant foremen formed the balance. If all of these staff, supervisory and management personnel are compared to the worker group a ratio of 1 to 2.9 results. This indicates a very high percentage of staff and management personnel to workers. However, the majority of these staff and management personnel are directly involved in the production process either in a planning and coordinating function or in the direct supervision of worker personnel.

1.4 ORGANIZATION ANALYSIS

The basic organization of the IHI shipyards (or shipbuilding element of a district) is strictly oriented toward production (as opposed to marketing, administration, etc.) Because of the relationship of the yards to the IHI Head Office, the yards are relatively free from much of the general business activities concerned with the analysis and acquisition of new business, labor union activity, and administrative functions related to customer and government contacts and contracts. Although the yards do maintain some elements of each of the above functions, these are much reduced in scope and practice compared

to a self-contained U.S. shipyard.

Essentially, the IHI yards are unencumbered by the requisites of a totally self-contained enterprise and, insofar as possible, solely dedicated to the design and production of the product sold by the Head Office. In this regard many of the functions attendant (but not necessarily contributory) to the production process are accomplished by the Head Office, thus allowing shipyard management and workers to concentrate totally on the production tasks. This results in a greatly reduced top-level managerial staff and a clear orientation of all management duties and responsibilities toward the "production" objectives.

The heart of the production system within the IHI yards is formed by the several "Workshops". Two of these workshops are dedicated to new ship construction: the Hull Construction Workshop and the Fitting Workshop. Other workshops accomplish production work for products other than new ship construction, such as the Ship Repair Workshop, the Boiler Workshop, etc.

Supporting these workshops are the Ships Design Department, the Material Department, the Production Control Department, the Quality Control Department and various administrative and Industrial Relations departments or groups.

The workshops are organized into "work groups" which logically follow the ship construction process, beginning with Production Planning and Engineering, and followed by Fabrication, Assembly and Erection. Outfitting activities generally follow the same process breakdown with fitting effort occurring at the various stages of sub-assembly, assembly and erection. Figure 1-6 provides a detailed functional

breakdown of each shipyard department and group.

In a typical process flow for a new ship construction program, once the job has been turned over to the yard by the Head Office, the Ships Design Department accomplishes the necessary drawing development plan and the basic production planning necessary for development of the correct technical information for the production workshops. Much of this work is typical of any design organization, however the production planning (accuracy planning) that is so necessary to all subsequent planning and scheduling is a unique aspect of the IHI system.

Production planning is a combined activity of the Design Department, the Production Control Department and the "Staff" groups within each production workshop (identified as Production Planning and Engineering Groups on Figure 1-6).

The Production Control Department is really a staff group to the general manager of the yard and is charged with the planning of all shipyard or "District" products. The output of this group is largely in terms of "key events" schedules which coincide with availability dates of shipyard facilities and required customer delivery dates. The detailed planning is accomplished by the yard Design Department in conjunction with the workshop "Staff" groups.

One of the most important "support" activities is that accomplished by the Material Department. This department comprises a Purchasing Group, a Warehouse Group, and an Allocation Control Group. These three groups attend to the ordering, receipt, storage, disbursement and movement of all material in the shipyard. The Purchasing and Warehousing activities are similar to those in U.S. shipyards. However, the

Allocation Control function is an unusual feature of- the IHI material control system. This group plans, schedules and operates all yard cranes and transportation equipment. This transportation of material includes purchased material and all fabricated units and assemblies within the yard. Because of the stringent requirements for movement and storage of assembled units, the Hull Construction workshop maintains an Allocation Control Shop to plan and control the movement of hull blocks (modules) and fittings, and scaffolding for erection. This Allocation Control Shop works closely with the Allocation Control Group in this planning and scheduling activity.

The Quality Control Department operates in similar fashion to those in U.S. yards. However, because of the emphasis on Accuracy Control and "self-checking", the IHI/Q.C. function is more a quality management activity than a true "control" function. A detailed discussion of the IHI Quality Control system and activity is contained in Livingston's Report on Quality Assurance, number 2123.5.1-4-1, dated 3 March, 1980.

1.4.1 The Work Group

Within IHI the basic organizational unit is the "work group". Although the term "group" is used throughout the organization to indicate different functions and numbers of people, the "work group" is generally used to describe the units of production workers concerned with the fabrication, assembly or erection process. These groups range in size from 5 to 10 workers. Each group is headed by an Assistant Foreman; is concerned with one particular part of the production process; remains in one location; and performs the same type of work on

each component on which it works. One member of each group is assigned as a checker for all work processed by that group. Several groups report to a single Foreman who is in charge of a particular "work area" within a shop or assembly area.

Insofar as possible, work groups are structured with permanent personnel, locations, equipment and procedures. The group's function is held as stable as possible throughout a production run of ships. Also, every effort is made to provide a continuous flow of work to each group in order to realize maximum productivity.

This type of group organization yields many benefits to the production process. Group organization and the system built on this organization provides a "mass production" atmosphere for virtually all production work, wherein each man has a specific job, the material is moved to the man, all necessary facility and equipment items are optimally positioned, proficiency increases to a maximum by virtue of repetitious work, and work measurement is easily achieved.

Perhaps more significant is the effect of this type of organization on the Japanese workers. The Japanese are particularly "group" oriented. Individual achievement is not considered an acceptable goal in Japanese society. Rather, cooperativeness and successful group participation are the virtues most admired. Strong identification with the "work group" and with the company for which one works, is common to most Japanese workers and the feeling of "family"-is likely to be as pronounced in these relationships as with a person's immediate family.

A high degree of camaraderie is developed both within the work

groups in the production areas and within the other larger "groups" in the shipyard, especially among personnel of the same age. This occurs because of several factors: the standardized schooling received by all employees; the fact that most employees are from the same geographic area; childhood relationships; and generally a common up-bringing in a common societal environment.

According to Edwin Reischauer* this group orientation stems from the earliest stages of child-rearing wherein the child becomes extremely dependent on the mother and later transfers this dependence onto teachers and social groups and, still later; onto company superiors and work groups. The acceptance of constituted authority is another important aspect of Japanese character derived from early training and continuing conditioning in Japanese society.

1.4.2 Staff Groups

One of the most interesting aspects of the IHI shipyard organization is the placement of Staff Groups (Production Planning and Engineering Groups) in each of the production workshops. These groups comprise a number of engineers who accomplish detail planning, scheduling, trouble-shooting and coordination of the myriad activities in each workshop (i.e. Hull, Fitting, Panel Workshops).

All accuracy control planning, workshop planning and sub-schedule development, lofting planning and scheduling, and data collection, analysis and feed-back is accomplished by these staff groups.

*Author of numerous books on Japanese culture and society; one time Ambassador to Japan; University Professor - Harvard University.

These groups work laterally across the organization and interface with each other throughout the development of planning and scheduling data and in all aspects of material flow, processing and integration.

On the basis of Master Assembly and Master Erection Schedules and the basic engineering plans, these groups develop all of the tower level information required to procure, fabricate, sub-assemble, assemble and erect the component parts of the ship. Their activities also include the implementation of the planning, working with the responsible managers and foremen in the several workshops.

Part of these groups' activity is concerned with the continual improvement of production processes, methods and techniques. Their close interaction with workshop personnel and the requirement for their development of process measurement and control graphs (e.g. manhours per meter of weld deposit), provides constant opportunity for them to analyze improved methods for doing-virtually every job in the shipyard. The improvement of productivity is one of their express objectives.

Figure 1-8 shows the distribution of staff personnel in the various departments of the IHI Aioi Shipyard. As shown in the figure, staff personnel are also used in Quality Control, Production Control, Material Control, and the Labor Relations Department. These personnel (with the exception of the Labor Relations Department) accomplish the planning and scheduling required to support the workshops in their respective areas. These people work closely with the workshop Staff Groups to coordinate all necessary aspects of production.

Figure 1-8 also depicts the Age Distribution of these groups in each organization. As shown, the majority of staff personnel are

SECTION	EDUCATION LEVEL									AGE DISTRIBUTION			
		4	8	12	16	20	22	24	26	OVER 50	40 to 50	30 to 39	20 to 29
HULL CONSTRUCTION WORKSHOP	*UNI.	■	■										
	HIGH	■	■	■	■	■	■	■	■	2	22	15	1
	OTHER	■	■	■									
FITTING WORKSHOP	*UNI.	■	■										
	HIGH	■	■	■	■	■	■	■	■	8	24	19	2
	OTHER	■	■	■									
SHIPS REPAIR WORKSHOP	*UNI.	■											
	HIGH	■	■	■	■	■	■	■	■	15	18	15	1
	OTHER	■	■	■									
QUALITY CONTROL DEPARTMENT	*UNI.	■											
	HIGH	■	■	■	■	■				8	18	12	1
	OTHER	■	■	■									
PRODUCTION CONTROL DEPARTMENT	*UNI.												
	HIGH	■	■							1	5	--	--
	OTHER	■	■										
MATERIAL DEPARTMENT	*UNI.												
	HIGH	■	■	■	■	■				9	19	7	--
	OTHER	■	■	■									
LABOR RELATIONS DEPARTMENT	*UNI.	■											
	HIGH	■	■	■						--	5	5	--
	OTHER	■	■										

* UNI. - UNIVERSITY
HIGH - HIGH SCHOOL
OTHER - MIDDLE SCHOOL OR OTHER

"A" - 31 MEN

FIGURE 1-8
DISTRIBUTION OF STAFF FOR EACH SECTION
AIOI SHIPYARD

between the ages of 30 to 50 with a very low percentage below age 30. This distribution indicates a high level of maturity extant in the Staff Groups and an equally high technological knowledge.

Within the IHI shipyards the Staff Groups are the connecting tissue between all of the direct production functions. Without the detail planning, scheduling, trouble-shooting and coordination effected by these groups the workshops would fragment into individual islands of activity dependent on upper management for detail direction and solution of any production problems. Under the current organization, line management and staff personnel determine the best means and methods to accomplish the work assigned and resolve any problems at the lowest level possible. The planning, scheduling and completion of the work is their combined responsibility within the confines of the established system and the governing Master Schedule.

SECTION 2

OPERATING PRACTICES

2.1 ORGANIZATION AND MANAGEMENT CONCEPTS

The IHI organization structure differs greatly from that of typical American firms primarily because it is more a description of functions than one of reporting responsibility. The American concept of delimiting-authority and responsibility via the organization chart is not understood in IHI nor generally throughout Japan.

Because of the group orientation of all Japanese organizations, the individual tends to participate fully in every activity where his knowledge and expertise have application. Further, it is common practice for disciplines to work laterally across the organization rather than in a strictly vertical fashion. For example, design engineers work with accuracy control, quality control and workshop staff personnel on a daily basis in an informal environment which allows each person to contribute to the fullest degree to resolve problems, make required changes, redirect work efforts, etc. Perhaps the best example of this lateral activity is that of the workshop staff groups who literally control the detail fabrication, sub-assembly, assembly and erection work related to their workshop down to the smallest level of detail. These staff engineers are required to work with every aspect of design and production and virtually nothing is beyond the purview of their responsibility.

The entire organization-is extremely informal and flexible. With the exception of detailed working plans and schedules almost all

communication is oral and written memoranda and procedures are almost totally absent.

Not only is the concept of organization different from typical American firms but so is the management philosophy inherent in the organization. The basic management objectives are to implement the policies set forth by the Chief Executive of IHI concerning the production of quality products and the provision of a personnel and labor management system which benefits all employees of the company. The implementation of these policies has engendered a highly sophisticated production system which has been perfected over the past 15 years. Underlying this system is the concept of Accuracy Control which is explained in Livingston's Report on Quality Assurance, dated 3 March 1980.

The emphasis on personnel welfare is the chief factor in the organization and operation of Japanese shipyards. The Japanese have instituted a system of "welfare capitalism" which seemingly works extremely well. This system works reciprocally in that the company provides almost totally for the welfare of the employee and the employee, recognizing his dependence on the company for his continued sustenance and well being, responds with diligent and progressively-improved effort. As a consequence, each looks after the welfare of the other and together they form a mutually beneficial relationship. This relationship is not simply an economic arrangement between labor and management. Rather, it is based wholly on the concept that human dignity and welfare is the end objective of any system and that the corporation and the *work* performed therein is simply the means to achieve that objective. In this regard the basic pattern of management systems

throughout Japanese industry comprises three distinct elements: the formal organization and hierarchal structure of the firm; the personnel and labor management system; and the characteristics of business behavior.

As explained above, although a formal organization is established for each company, the structure is not necessarily indicative of the functioning of the organization. Strict compliance with the organization chart is not a requirement in Japanese industry. Rather, individual contribution to group action is what is considered appropriate and desirable. This contribution can be completely outside of one's organizational jurisdiction. As a matter of fact, very little attention is paid to organizational placement except in matters which must be elevated to a higher level for decision making. The work or production system is the element that is highly regulated rather than the organizational structure.

The personnel and labor management system is integral to the overall shipyard production system. Although there are discrete functions dealing with labor and industrial relations these functions cannot be totally separated from all other aspects of company operation. For example, the functions of personnel recruitment and training, personnel allocation (to work area), and management/labor union involvement are certainly inherent aspects of the production system. However, because of the reciprocal aspects of the personnel welfare programs and their impact on productivity, they too must be considered part of the production system. Therefore, all elements of personnel utilization and welfare are considered vital parts of the total management system.

The area of "characteristics of business behavior" encompasses those attitudes of employees and management regarding: the "group" concept (i.e. from small work groups to the view of the company/corporate group or "family"); the combination of labor union and company management objectives and attitudes; and the use of communications involved in the decision making process (i.e. solving problems at the lowest level possible, "bottom-up" proposals for problem solving or production improvements, committee action, and the use of middle-level managers as "opinion leaders"). These behavioral characteristics are important in the management structure from the standpoint that they form an acceptable code of business conduct at every level of the enterprise.

This entire management system relies on the personal integrity of both management and workers and on their common goal of preserving the welfare of both the company and the individual employee.

2.1.1 The Personnel System As An Element Of Production

Many interrelated systems form the total shipyard production system within IHI. Some of these "systems" are identified as such and are common to the ship construction process of every shipyard. The Planning and Production Control System, the Material Control System and the Quality Control System are typical examples of these traditional elements of the production process. However, the basis of all Japanese systems is a business philosophy concerned with personnel welfare and the many tangible programs and practices manifesting this philosophy form a distinct "personnel system" integral to the production process. In fact this "personnel system" is the basis for the production system

and is the primary reason for the existence of the company. All people involved in the company (indeed in the industry) from customers to stockholders to workers are seen as beneficiaries-of company(industry) activity. The company exists to benefit all people not just the few who have invested capital in its operation.

On the worker level this personnel orientation is specifically aimed at providing a healthy, useful and meaningful occupation with maximum security, identity and dignity for all employees. The production system has been structured to provide maximum satisfaction of these objectives.

The IHI yards do not recognize the elements of personnel organization and welfare as a "system". However, IHI, as well as all Japanese industry, readily identifies the personnel basis for all economic activity and the Japanese worker as the principal ingredient in all economic and industrial success.

In contrast to this personnel orientation American industry might be seen as "system" oriented, equating people with procedures and facilities. American organizations typically work in a more vertical and "compartmentalized" fashion with clearly defined responsibility and authority boundaries. Lateral organizational activity is sometimes closer to competition than cooperation and the profit motive is quite obviously the primary driving force behind company management.

In American companies the strong adversary relationship between management and labor unions still pervades much of the thinking of company executives and middle level managers, and expenditures for personnel welfare are nearly always contested areas in company/union

contract negotiations. Seldom, if ever, are these expenditures voluntarily undertaken by the company itself. The obvious results of such an adversary relationship are manifest in the high attrition rates, absentee rates and the low productivity statistics characteristic of many American industries.

The "system" orientation of American firms also essentially denies any strong identification of the workers with the firm. Instead, workers tend to identify with their respective trade and the union which represents them. This is understandable when the worker's job security is, from all appearances, vested in the strength of the union rather than in the beneficence of the company.

Typical American practice tends to view the employee as merely a replaceable component in the company "system", that can be removed and replaced as easily (and in the same cavalier fashion) as a piece of equipment or an electronic "black-box". Too little attention is paid to attempts to "educate", "train" or otherwise counsel the employee so that he can accomplish the job specified for him. More likely, there will be an endless substitution of employees until one is found that can perform satisfactorily.

By these few examples, which are commonplace in American industry, it is possible to extrapolate them any and far-reaching ramifications of American practices versus those of the Japanese. A simple comparison of the productivity indices of the two countries is the best indicator of the effectiveness of these two approaches.

2.2 THE LIFETIME CONTRACT

When a person is hired into IHI shipyards it is with the understanding that the employment is for the working life of the employee.

A "lifetime" contract is established, (although not in written form), between the company and the employee which assures employment for the employee's working career with IHI, beginning with the initial hiring and lasting until the age of retirement.

Implicit in this contract are all of the wages, bonuses, other personnel benefits and welfare programs subscribed to by the company under its annual contract with the shipbuilding union (the Confederation of Shipbuilding and Engineering Workers Unions) .

The contract. can only be broken through bankruptcy of the firm, an employee's voluntary resignation, or criminal action on the part of the employee.

Under this arrangement the employee cannot be laid off or fired but may be relocated inside the corporation if work declines to a point where an individual company within the corporation cannot support its workforce.

This "lifetime" contract is an important aspect of the IHI personnel program and contributes substantially to the stability, tenure and productivity of the IHI workforce.

IHI shipyards generally recruit new employees directly from high schools and colleges as close to the shipyard location as possible. This recruiting practice assumes that the prospective employee wishes to remain in the same area where he was raised, has family and has attended school. In the past this recruiting practice has succeeded in attracting highly stable and well motivated personnel.

The Japanese have strong family ties and equally strong ties with the various social groups with whom they have grown up, attended school

or otherwise been involved. Obtaining a job in an area which allows proximity to these social contacts is a primary concern to most Japanese. Although the advent of rapid transportation (mainly via express trains) has somewhat mitigated this attitude most Japanese still prefer living and working in their native area.

The Japanese also maintain a definitive attitude toward organizational mobility. The traditional attitude is that once employed by a company it is considered disloyal, and hence shameful, to change employment to another company for any reason. This attitude has suffered somewhat from the influence of Western thinking and practices, especially among the younger generations in Japan, however, the traditional attitude still prevails in the majority of Japanese.

Both of these aspects of behavior are considered and to a large degree satisfied by the IHI recruiting practices. The "lifetime" contract is a major factor in assuring security for the employee, allowing residence close to group ties, and providing reciprocal loyalty to and from the firm.

In recent years employment of new employees has virtually stopped at all IHI yards. Because of the reduction of capacity and employment required by the international recession in shipbuilding, the IHI yards have reduced their workforces by 30 to 35 percent of the levels achieved prior to 1976. This reduction has been effected by: normal retirements, voluntary early retirements, a cessation of hiring activities, reassignment to work other than shipbuilding and reduction in the use of subcontractors. Some re-location of shipyard employees has been necessary; for the most part, however, shipyard workforces have

remained intact and the retirement attrition and curtailment of hiring[#] have been sufficient to accomplish the desired reduction.

Under prevailing conditions any increase in workforce required by a temporary surge in workload is satisfied by increasing subcontractor support. Conversely, a decrease in workload is offset by decreasing subcontractor support and by moving workers to "special projects" such as bridge building, heavy steel fabrication for industrial products, ship repair, etc.

The "lifetime" contract concept has thus far proved extremely effective in creating and perpetuating a superior workforce at the IHI yards.

2.3 WORK RULES

Observation of the IHI yards leads to the conclusion that even though the production activity is highly systematized and controlled, the actual working environment is relatively relaxed and informal. This is partly due to the inherent Japanese character and work ethic which assures maximum effort on the part of most employees all of the time. Therefore no rigid personnel work rules are necessary for the majority of personnel. Work rules do exist, however, and are documented in a series of formal policy statements. An example of these rules is provided in Appendix A.

2.4 COMMUNICATIONS

Communications in the IHI yards are largely informal and by American standards totally lacking in formal documentation. Typically the Japanese conduct the majority of their business "face-to-face" in either individual conversations or in meetings of the interested parties.

The Japanese pride themselves on their ability to communicate informally and this is coupled with a distinct desire for consensus decisions. The formal, written, factual and straight-forward memoranda and report type of communication characteristic of American business are considered to be too harsh and too time consuming by the Japanese.

The result-of the Japanese type of communication is a more direct interface and interrelationship among the various groups and organizations within the shipyard. Almost all education, training, problem solving, and conveyance of planning, scheduling and, similar information is accomplished by group interaction using rough sketches, manually-prepared pencil schedules or other planning data, and very active, but highly respectful, conversation among the participants.

This type-of communication has several ramifications, one of the most significant being the almost total absence of clerical personnel. Of course, clerical personnel are used by upper management and in many administrative functions. However, the operating managers, supervisors and staff personnel are almost totally without secretarial support.

Another significant aspect of this communication system is that it encourages problem-solving in a direct manner without waiting for replies to memoranda or approvals of lengthy reports and plans. It also ensures that all personnel needing information and/or needing to participate in decisions are contacted, brought into the decision-making process and provided with ideas and recommendations from all participants. This process literally forces a decision and avoids the prolongation of problems which affect the production process. Additionally, this type of communication augments the "group" atmosphere of the shipyard yielding

an even greater sense of identity with, and participation in, the affairs of the company. It also means a relatively larger amount of time spent in meetings. This is not seen as a problem, however, because Japanese workers require relatively little supervision.

Still another aspect of communications lies in the "word-of-mouth" training that occurs at every level of the organization. The Japanese refer to this training as "education" and feel that it is an inherent responsibility of every older worker or supervisor to pass on his knowledge of the job to newer employees. It is also considered a responsibility to communicate upward about any ideas for product or production improvement. The several incentive programs sponsored by the company encourage this upward flow of ideas.

Although communication is achieved very informally (by American standards) it is usually very complete and explicit. A great reliance is placed on visually displayed diagrams, sketches and schedule information. Color coding is used extensively to indicate various conditions of material flow or work-in-process. These devices, coupled with oral communication, suffice extremely well in virtually all yard activities including direct communication with the workers in each area. In this regard, large graphic displays of safety requirements, material layout (in a shop. area) and material flow are seen in the many areas of fabrication, sub-assembly, or assembly. Also, work group and shop schedules are posted in prominent areas where workers can track performance as schedule dates or milestones are colored-in according to progress achieved. Machine or crane operating warnings or instructions are displayed appropriately throughout the shops together with other

safety reminders and mandatory requirements. Most of these are created manually by staff engineers.

On each piece of steel complete identification markings and alignment, burning or bending symbols are used to communicate material information. After sub-assembly, a "travel ticket" and a Quality Control Inspection Sheet is attached to each unit designating its status and destination at each stage of processing". These attached sheets are pre-printed and require only a series of check marks or entry of a few numbers or remarks. Similarly each piece of outfitting material is marked, inventoried and disbursed by coloring each item on a Material List. Thus, with extremely few pieces of paper all material is identified and controlled as it moves through the production process.

Identification of personnel is accomplished by color code and a series of simple markings on the helmets of all yard workers, supervision and management. These markings identify status, function and department of yard personnel.

Throughout the IHI yards, communication appears to be an important but understated part of the shipbuilding process. As in so much of the production system itself, communication has been systematized and standardized to the maximum extent possible. Standard forms, symbols, and markings; and design, material and process standards have reduced the need for much oral communication on a large number of production activities. Although there does not seem to be much conscious effort to reduce or improve communications, it seemingly has happened as a natural outgrowth of the Japanese character and the continual refinement of their production systems.

2.5 PRODUCTIVITY IMPROVEMENT PROGRAMS

Several company-sponsored programs involve workers in continuing attempts to improve productivity in the IHI yards. In this regard conservation of both time and materials is **considered a productivity improvement**. Therefore, there is as much emphasis placed on the reduction of cost through conservation as for innovative production improvement ideas.

Three of the major improvement programs are the Suggestion/Award Program, the Zero Defects Program, and the Cost Reduction Program. Each of these programs receives a great deal of attention from both workers and management in the IHI yards. A friendly competition exists both within the yards between departments or work groups and also between shipyards in different locations.

2.5.1 Suggestion/Award Program

Like most Suggestion/Award Programs in the U. S., the IHI program operates on the basis of suggestions for production improvements from employees. Suggestions are evaluated by management and awards given for valid suggestions. IHI however, does not employ a passive attitude toward these suggestions or the effects of the program.

At the beginning of each year company management assigns goals for each department as to the number of suggestions expected. Each department manager and each group foreman attempts to meet the goal by stimulating group interest in improvement suggestions. Competition between groups is encouraged by monthly reports of the suggestions made by each group.

The company presents numerous awards for valid suggestions. Although the awards usually amount to only \$5 to \$10 (occasionally up to \$50) there is a great deal of personal satisfaction on the part of the workers having a suggestion accepted. Also, the worker making the suggestion is allowed to implement it if the recommendation affects his particular job (e.g. a suggestion for a particular jig or fixture).

As an example of the magnitude of the program, in July 1979 Kure Shipyard was receiving approximately 3000 suggestions per month. In the prior year, the yard had awarded \$41,500 to employees and estimated that as a consequence of the improvement suggestions approximately \$1,000,000 had been saved.

Most of the money earned from suggestions is placed by the winners in a group fund for an eventual group celebration.

2.5.2 Zero Defects Program

The Zero Defects Program is very similar to those established in the U.S. It is mainly a slogan program encouraging high quality workmanship. In IHI, because of the heavy emphasis already on quality, the Zero Defect Program is simply a reinforcement of current practice. This program emphasizes productivity improvement by minimizing accidents, work errors, re-work, waste and loss. In many regards it supplements the Safety program and the Quality Assurance aspects of the IHI production system.

2.5.3 Cost Reduction Program

The Cost Reduction Program is an innovative approach to the reduction of basic shipyard costs not necessarily pertinent to the production process. This program is aimed at the reduction of utility and other

facility items involving the use of outside services and materials.

At the beginning of each year, each department is required to prepare a Cost Reduction Plan stating what areas of cost reduction will be attacked, how cost reductions will be effected, and an approximation of how much can be saved. These approximations are then assigned as targets for the respective departments and actual savings are measured monthly against the targets.

2.6 EMPLOYEE ATTITUDES

Given the job security of the Lifetime Contract together with the personnel benefits and welfare programs discussed in subsequent sections, the Japanese worker enjoys an enviable position in the industrial world. The often-evaluated psychological drives attributed to human beings in a working environment seem to be well satisfied by the Japanese industrial system. In this system the Japanese workman enjoys security, identity, participation, and meaningful and satisfying employment in a working career of his choice.

Such circumstances would lead an American industrial manager to question the individual productivity of workers who ostensibly have a lifetime guarantee of a job, good pay and (by U.S. standards) exorbitant fringe benefits. It is this question that causes perhaps the greatest perplexity on the part of U.S. observers of Japanese industry, for instead of the expected and common U.S. worker attitudes what is found in Japanese workers is an intense and continuous application of effort in all jobs in all areas.

Japanese workmen work across trades in almost every shop and area of the shipyard. In both hull and fitting areas many IHI workers are

trained to do both welding and fitting work, and every employee is trained in cutting, welding and crane signaling. The rigidly controlled production system does however, preclude much work outside of each man's work area or assigned task. For example, welders are seldom used for anything but welding work simply because the production system is geared to provide a continuous flow of welding work to the welding stations.

In IHI welders in shop sub-assembly areas normally operate five gravity-feed welding machines simultaneously. Depending on a man's ability he may operate as many as ten on some sub-assembly work. Personnel assigned to N/C cutting or flame planing machines will manually trim or cut small pieces from plate as the plate moves through the machine. Personnel operating bending machines may also be alternately accomplishing flame bending of the material, individually or in a group where each of the personnel are capable of doing both jobs.

Throughout the shipyard what is considered "normal" activity seems almost frantic to a U.S. observer. During the Livingston visits (in July 1979 and October 1979) to the IHI shipyards only one idle worker was noticed in four weeks by the six and seven man Livingston teams.

This diligent effort is characteristic of the Japanese workman and has its roots in Japanese culture and ethics. The attitudes of the Japanese regarding proper behavior, personal responsibility and integrity are manifest in their work habits, and in their respect for others in their work group, and for the company for whom they work. These attitudes are equally apparent throughout the management levels of the company and the IHI corporation. It is these attitudes which, perhaps more than any other single element, contribute to the stability and performance of the IHI shipyards.

SECTION 3

PAY RATES

3.1 EMPLOYEE PAY RATES

As of May 1979, Japan's Confederation of Shipbuilding and Engineering Unions Research Bureau. published the following statistics on average pay rates for 204,800 shipyard employees:

1.)	Average Age 35.8	Average Length of Service 13.7			
2.)	Average Basic Wage* (as of June 1978) - Monthly -	\$857.18			
		5.20			
3.)	Extra Pay fur Overtime				
	(a) From 5:30 p.m. - 8:00 p.m. :	130% of hourly wage			
	(b) Before 9:00 a.m. and after				
	8:00 p.m., and weekends :	155 to 160% of hourly wage			
	(Based on 15 O/T hours per month average for large shipyards in 1977)	101.30 per month			
4.)	Bonus				
	(Based on average paid by 71 large shipyards in 1978)	\$281.73 per month			
5.)	Welfare Benefits	\$200.00 per month			
6.)	Monthly Summary				
	<u>Basic Wage</u>	<u>O/T pay</u>	<u>Bonus</u>	<u>Welfare Benefits</u>	<u>Total</u>
	\$857.18	101:30	281.73	200	\$1,440.21
7.)	Hourly Summary				
	<u>Basic Wage</u>	<u>O/T Pay</u>	<u>Bonus</u>	<u>Welfare Benefits</u>	<u>Total</u>
	\$ 5.20	0.61	1.71	1.21	\$8.73

*Based on an 8 hour day and an exchange rate of 200 yen per U.S. \$.

The above figures represent the overall wage structure of the Japanese shipbuilding industry. These figures do not reflect individual shipyard cases or all of the personnel fringe benefits allowed by some of the companies. When the IHI yards were examined in July of 1979, all of the above figures were lower than those presented by IHI.

In all Japanese shipyards, cost-of-living increases are given twice a year in addition to regular annual increases. These pay adjustments may account for the higher IHI wages prevalent in mid-1979.

In the area of management and supervision, which are not represented by the union, several classifications exist ranking the salaries from Class 1 (highest) to Class 6 (lowest). These salaries are determined by the District General Manager and reviewed at least once a year for correspondence with cost of living increases and new union settlements. Generally, management gets a rate of increase in salary and bonus commensurate with that obtained by the union.

3.2 PAY INCREASES

Within the IHI Wage and Salary System individual wages are adjusted at intervals other than the annual wage increase negotiated by the union. The criteria for wage adjustments are divided into two parts: Part A is concerned with the employee's age, education and length of service with the company; Part B concerns the employee's job performance, job knowledge, capacity to do the work and his attitude toward his job and the company. The evaluation of these criteria by an employee's supervisor determines his rate of pay, however, the rate is controlled by a rate structure established by shipyard management.

A "Special Allowance" over and above an employee's basic pay is added on special occasions; for example, when an employee is married. and upon the birth of each child. The rationale for this is that the employee has added responsibility and therefore deserves added consideration from the company. Special allowances are also provided upon the death of the employee, a member of his family and in the event of major injuries to him or his family.

3.3 PROMOTION AND LINES OF PROGRESSION

Promotions within IHI, or for that matter, Japanese industry as a whole, are infrequent relative to those of U.S. firms. In the very stable organization of Japanese shipyards promotion generally comes only as a result of the retirement of older higher-level employees or through expansion of operations by the company. Since the curtailment of capacity and workforce brought about by the shipbuilding recession, this latter opportunity does not present itself frequently.

Promotions are based on the same criteria as pay rates, i.e. age, education and length of service, and usually cannot be expected for many years after joining a company.

The line of progression that ostensibly could be achieved by a new employee is from apprentice to worker to assistant foreman to foreman. Generally, a production worker will progress only to the level of foreman and the typical shipyard organization shows a clear break at the foreman level. Above this level are the Staff personnel (attached to workshops, technical staff positions reporting to the yard superintendent, or in administrative functions) who typically have university degrees and are classified as engineers. From this staff level the line

of prgression is to section leaders and thence to the various levels of management including that of the Yard Superintendent.

SECTION 4

BENEFITS

4.1 VACATIONS AND HOLIDAYS

IHI provides a very liberal vacation program for its employees ranging from 14 to 20 days depending on length of service with the company. These-vacation (and holiday) provisions are par of the union contract.

Vacation time for an employee with from one to three years service is 14 days per year. From four to five years of service this time is raised to 17 days and from the sixth year until retirement 20 days vacation is standard. Vacation time can be carried over from year to year to a maximum of 40 days. No carry-over is allowed in excess of 40 days.

In addition to vacation time, each employee is given 18 paid holidays. Many of these are religious holidays occurring in the Spring and again in the Fall of each year. During these holidays the entire shipyard closes for a period of from one to two weeks.

4.2 BONUS PROGRAMS

In mid-summer each year the union negotiates with the shipbuilding industry to determine the annual bonus to be paid each employee. This negotiation is based to some extent on how well the industry is fairing or has faired during the past year. The union considers that the annual bonus is part of the basic remuneration paid to shipyard personnel and therefore strives to maintain and improve this compensation during these negotiations. Generally, a mutually agreeable figure is decided and the bonus is paid in two payments, one in the summer, the other in

the winter.

According to the union report* mentioned previously, the bonus for each employee amounted to \$3,380.77** for the year 1978. Bonus figures for 1979 were not available.

This annual bonus does not, however, reflect all of the bonus paid by the company to individual employees. Many of the bonuses paid are congratulatory or consolatory and involve paid absences as well as direct cash contributions. The following paragraphs provide details of these additional bonuses.

4.2.1 Congratulatory Bonuses

Congratulatory bonuses are paid to employees upon getting married and upon the birth of children. Approximately \$175 is the bonus upon getting married accompanied by five days off with pay and \$25 is paid upon the birth of each child with five days off with pay. These bonuses are in addition to the pay adjustments which also accompany these events.

4.2.2 Consolatory Bonuses

Consolatory bonuses (or solatiums) are paid to employees upon the death of a wife (\$150 with seven days paid leave) or child (\$75 with seven days paid leave).

Upon the death of an employee, the wife is given \$1000 by the company and, in a job-related death, the Japanese equivalent of Worker's Compensation will contribute \$80,000 in a lump sum plus 50 percent of her spouse's average monthly earnings for the last three months is paid monthly for the remainder of her life.

*Japan Confederation of Shipbuilding and Engineering Unions Research Bureau report dated May 1979.

**Based on a conversion rate of 200 yen per \$.

Also, in case of the death of an employee (on or off the job) a scholarship fund is established for each child of the deceased. For each child attending school who is over the age of 18, the amount paid is \$75 per month. Under 18 years of age the amount is \$50 per month.

4.2.3 Retirement Bonus

A retirement allowance (bonus) is paid to all employees who have achieved 30 years of service with the company and have attained the age of 55. Although 58 is the normal retirement age, workers who meet the above conditions are treated as retirees and paid the retirement allowance. Upon reaching the retirement age of 58, workers normally have the option of remaining with the company for an additional two years or retiring, depending on the state of their health. However, because of the cut-back in production in recent years most retirees have voluntarily retired upon reaching 58 or even earlier at age 55.

The retirement bonus is based on the education and position of the employee in the company at retirement. The lowest bonus paid would be to a technical worker who had graduated from a junior high school and had spent 30 years as a worker. In this case (in 1978) the retirement bonus was approximately \$42,000. In the case of an engineer with a university degree this bonus would be approximately \$100,000. Upper management would get proportionately more.

The primary purpose of this bonus is to provide for the employee and his family until the Japanese system of social security takes effect at age 60. Most workers use the retirement bonus to purchase or complete the purchase of their home. Housing in Japan is extremely expensive and the acquisition of a home is usually a lifetime proposition.

4.3 INSURANCE

Health insurance programs are in operation in all IHI companies. This insurance typically covers hospitalization, out-patient expense and the expense of drugs and medications. These programs are not unlike those provided by American firms except that generally the benefits are more all-encompassing and the company pays the total premium.

In the case of accidents on the job the company supplements the insurance benefits as mentioned in the previous paragraphs.

4.4 HOUSING AND DORMITORIES

When an employee is first hired and relocates his family to the shipyard site, temporary housing may be provided until he can locate a residence. Generally this temporary housing is provided by the company free-of-charge for a period of 30 days. However, in some cases, permanent housing may be provided within the confines of the shipyard for foremen, section managers and managers. In this case a nominal rent is charged.

Many new employees are bachelors when they first go to work for the shipyards. Because of the low beginning pay offered these new employees the company also offers dormitory quarters at a very low rate (approximately \$4.00 per day). Single apartments in the towns or cities adjacent to the shipyard complex would normally rent for \$325 to \$500 per month. Therefore, a considerable saving is offered by the company to single individuals.

When an employee marries and can no longer use dormitory facilities, the company offers low-interest loans to assist the employee in the purchase of a home. As mentioned previously, housing anywhere in

Japan is very expensive. For example, in Aioi sufficient land for a 2000 square foot house would cost (in July 1979) approximately \$50,000. The house itself would also cost \$50,000. Most newly-weds would not consider this level of expense for a home, but a price range from \$40,000 to \$50,000 for both the land and the house is not unusual as a starting home. Interest rates charged by the company for housing loans vary in accordance with the rates available on the open market. Company interest rates are, however, always substantially below market rates.

4.5 CAFETERIAS AND COMMISSARIES

At all IHI shipyards a company cafeteria is operated for employees. Employees living on-site (in company housing or dormitories) can obtain all meals at these cafeterias. Personnel living off-site generally eat lunch at these facilities.

The cost of these cafeterias is shared by the company and the employees, in that the facility, food preparation and handling service is borne by the company, whereas the cost of the food itself is borne by the employees. This sharing of costs provides for low cost meals (approximately \$0.60 for lunch) for all employees. A similar arrangement is provided for the management staff in separate facilities adjacent to their work areas.

At some yards small commissaries or co-ops are provided for employees. Usually these commissaries carry a modicum of foodstuffs and typical drug store items but may also carry small appliances and tools. Items sold in these commissaries are usually priced well below those of retail merchants in the city. The co-op is a form of company store

in which the employees can buy shares for profit. Shareholders get some reduction in prices, but their primary function is to obtain a higher quality of food and a return on their investment. If the co-op is managed properly and makes money, shareholders receive dividends on their stock similar to the U.S. Credit Unions.

4.6 TRAVEL ALLOWANCES

The cost of commutation tickets (usually by train) is totally paid by the company for employees requiring such travel. Also, for employees who drive personal cars to work, travel allowances are paid according to the distance of travel required.

4.7 WORK CLOTHING

All employees in the shipyard are issued uniforms, safety boots, gloves and safety helmets by the company. This clothing is replaced by the company when it is sufficiently worn. Proper clothing is considered essential to the safety program and, therefore, has been standardized throughout the shipyards. Even visitors are required to wear the uniform and helmets when observing yard operations. Employees are responsible for maintenance of the clothing (i.e. laundering, etc.).

4.8 COMMENDATION FOR LONG SERVICE

Prizes (usually monetary) are awarded to employees who have served 20 years with the company. Successive awards are made every five years thereafter.

Upon reaching retirement age, employees and their wives are given a four day trip by the company with all expenses paid.

SECTION 5
PERSONNEL WELFARE PROGRAMS

5.1 GENERAL

In addition to the many employee benefit programs extant in IHI, several other on-going activities pertain to the safety and quality of life of the IHI workers. These established programs are augmented by management/union negotiations on personnel welfare occurring in the fall of each year.

Personnel welfare embraces all aspects of safety, environment, recreational facilities, medical/dental care, and employee relocation. These elements of employment are considered equal in importance to pay rates and benefits by the individual employees and their union.

5.2 SAFETY AND SANITATION

Safety is of paramount importance in the shipyards of IHI. Intensive programs are continuously conducted to improve the safety aspects of ship construction. Throughout the yards, safety devices, signs, and safety inspectors are in evidence everywhere and the individual workers are extremely "safety-conscious". Every shipyard activity has prescribed safety rules which are monitored continuously by assistant foremen, foremen, and safety inspectors. The safety program is well defined in a handbook distributed to all personnel.

Each yard maintains a full-time Safety Group which is in charge of the safety program and its implementation in the yard. In Aioi, this group (in July 1979) consisted of ten employees under the direction of a Safety and Sanitation Chief. The Safety Group is divided into various

sections: the Staff, which is responsible for formulation of safety policy and instructions; a control committee for subcontractor safety requirements; and a safety inspection group who perform daily inspections of shipyard activities, correct unsafe conditions and operating practices, and report back to the staff groups on inadequate safety measures.

This emphasis on safety has resulted in a very low incidence of job related injury. For example, in Aioi a total of 9 lost time injuries were reported in 1978, 5 in 1977, 11 in 1976, and 9 in 1975. The number of deaths in the yard since 1974 total three, two of which were subcontractor personnel.

Sanitation is also a major element of the Safety Program in the shipyards. This activity, which is a function of the Safety Group, is concerned with all shipyard environmental conditions such as air and water pollution, noise, the working environment in shops, assembly and erection areas, and the environmental effects of the shipyard on the community. In these activities, stringent control of pollution (air, water, and noise) is accomplished and shipyard working conditions constantly improved. Under the safety and sanitation programs, shop conditions have been improved by various types of ventilation systems, the enforced use of proper respiratory protection equipment, improved lighting, the removal of high noise equipment (e.g. chipping hammers) and through strict enforcement of open aisleways and transport lanes.

Sand blasting, acid cleaning, and primary painting operations are confined to enclosed buildings and the processes automated to the

scaffolding with safety rails and netting are used to provide easy and safe access to all parts of the large assemblies and the ship. As part of each employee's uniform, a safety rope is worn attached to a web belt for use whenever working in high places. These and many other devices and procedures are an inherent part of the production process and the continuous safety and sanitation improvement programs constantly seek new means for improving the working environment of the shipyard and for preserving the living environment of the community.

5.3 ENVIRONMENT

Separate from the safety and sanitation aspects of personnel welfare is the attempt to make each yard a pleasant working environment. This activity concerns the appearance and habitability of the shipyard and its desirability as a place to work.

The primary element of concern is cleanness of the facility and the orderly arrangement of all of the various shops, platen areas, storage areas, etc. This orderliness is supplemented by green areas (i.e. small areas of lawn, trees, various plants), fish ponds and smoking areas, wherever possible. In many yards, because of the limited space occupied by the yard, these green areas are minimal. However, in the yards designed and built by IHI, Chits and Yokohama, large areas were dedicated to lawn, trees and shrubs.

Maintenance of buildings and other large installations is also a part of this environmental concept. All facilities are kept painted and free from rust and corrosion. Roadways, bicycle paths, transporter parking areas and employee recreation areas are also kept clean and freshly painted.

All of the IHI shipyards are completely paved either with concrete or asphalt. This contributes significantly to the cleanness and attractiveness of the facility.

Another significant feature contributing to shipyard appearance is the use of pallets for the collection, storage and movement of materials. All small fabricated parts and outfitting materials are segregated on pallets of various types and sizes, as well as many loose working tools and equipment such as crane cables and alignment or attachment jigs. These pallets are usually stored in warehouses or immediately adjacent to the appropriate working area in designated locations. This use of pallets contributes greatly to facility appearance and is an essential part of the material control process.

Within the shops, all power equipment for welding processes is placed on mezzanine balconies around the periphery of the shop. Cables from these power supplies run overhead in conduits to remote welding machines suspended above the precise area where welding operations are required. Five welding machines are ganged together at these remote stations for use by welders on five individual welding operations. This system completely eliminates welding cables and other electrical cables from floor areas.

Even though many of the shipyards are cramped for space, facility layout has been effected to provide liberal areas for material processing both inside and outside the various shops. Because of this layout, work is generally easily accessible and work areas are rarely crowded by too many employees in one location. Wherever possible, work is performed by automatic machine, enabling a high production flow with minimum personnel.

Control of scrap is another important aspect of facility cleanness. Scrap containers are situated in proximity to every operation and employees are charged with the responsibility for maintaining their work areas in a clean and safe condition at all times. Scrap is promptly removed after each cutting operation and slag from welding operations is either collected in pre-positioned containers beneath welding tables or automatically dumped by a slag-collecting plate conveyor used for welding activities.

Several practices are used by the IHI yards for periodic yard clean-up by employees. The IHI Kure shipyard stops work for 30 minutes at the end of the day to allow employees to thoroughly clean their work areas. In Aioi workers clean-up throughout the day at intervals where there is a break in the work flow or immediately after each operation which yields scrap or other residual material requiring clean-up.

5.4 EMPLOYEE FACILITIES

Throughout the IHI shipyards, numerous facilities are provided for the employees ranging from housing to recreational areas. There is a determined effort to provide for the health and morale of the IHI workforce which embraces aspects of diet, exercise and convenience.

As previously mentioned, cafeterias are provided on a cost-sharing basis for all employees. Also, either temporary or permanent housing is provided for new personnel moving into the area, for bachelors, and, in some cases, supervisory and management personnel and their families.

In addition to these employee facilities, recreational areas and facilities are provided by the company such as swimming pools, baseball diamonds, club houses, and the like. Also, many areas are designated

in the yard (on streets) for employee activities during lunch time and after work. These areas are for use by the employees for games such as tennis (without the net), volleyball, or any other team activity that can be accommodated in the prescribed area.

During lunchtime, no vehicular traffic (except bicycles) is allowed to operate in the yard so that all surface area can be used for recreational activity.

This company emphasis on recreational and other types of personnel facilities is another manifestation of the personnel welfare programs and attitudes of IHI management. However, as in most other aspects of these welfare programs, there is a sound business reason for these benefits. The company profits from these benefits in building and sustaining the morale- of the workforce, helping to maintain the health of i workers, and further ensuring that, through the provision of a good and desirable work environment, a stable, company-oriented, and productive personnel complement is always available for any size of workload and backlog.

5.5 MEDICAL/DENTAL CARE

Each IHI shipyard has at 1 east one full-time doctor and one full-time dentist on duty at all times. Medical care is provided for all workers as required, whether for job-related injuries or not. Provision of medical and dental service in the yard naturally tends to decrease lest time due to employees having to seek outside medical/dental attention. It is also a significant benefit for employees as the service is cost-free for the employee.

Generally, the doctors and dentists and the medical facilities within the shipyards are an extension of the local hospital, which provides more thorough medical assistance if required and provides for-treatment of the employees' family members.

Resident doctors also provide counsel to the General Superintendent regarding health hazards and conditions in the yard, and the health of the workforce. They also act as medical advisors in all matters involving sickness, injuries, workers' compensation cases, or other matters pertaining to the general health and well-being of the employees.

5.6 EMPLOYEE RELOCATION

There are two distinct aspects of employee relocation: moving the employee from one job location to another within the shipyard; and relocating the employee from one company to another to preserve the "life-time contract". In the first case, a concerted effort is made on the part of the company to avoid excessive movement of employees from one work site to another, for a number of reasons. First Of all the company wishes to preserve the "work group", recognizing that a characteristic camaraderie exists in each group which contributes to the feelings of "belonging", personal well-being, and identity of the employee. Intangibly all of these factors contribute to productivity. Moving an employee out of his work group even for a limited time seriously impacts the man's productivity and the quality of his work. The Quality Control Department has studied many cases involving the movement of employees and has documented evidence proving the decrease in personnel effectiveness in such cases. Fur example, workers moved from new ship construction to ship repair exhibit a significant change in productivity

simply because the employees did not feel that repair work was their type of work. They did not feel "at home". Part of this feeling was concerned with the different materials and equipment that had to be used on the different work.

The movement of entire work groups to different work did, to some degree, ameliorate the degradation of productivity and quality. Group movement is, therefore, the preferred situation in cases where employee movement is mandatory.

In IHI, when an employee is moved between various types of work or different locations, he is tested to first determine if he can perform the new work. Upon completion of the assignment, he is re-tested to assure that he has not lost some of his skill while in the new assignment.

The second instance of personnel movement is that involving the relocation of employees from one company to another due to a decline in workload or to other circumstances where the move is for the convenience of the company. In these cases, the company does everything possible to accommodate the employee in terms of finding the best job, providing sufficient move time and paying all expenses attendant to the move.

Since the decline in shipbuilding capacity in the mid-1970's, IHI has been forced to relocate some employees. Usually this relocation occurs at the Staff or Manager level. Workers are seldom required to relocate except in the event of a plant closure.

SECTION 6
MANAGEMENT/LABOR RELATIONS

6.1 THE MANAGEMENT/LABOR "PARTNERSHIP"

In almost diametric contrast to the management/labor relationship of the United States, Japan has achieved what appears to be an almost ideal marriage of labor and management objectives. These objectives are mutually beneficial to both workers and the company and there is a thorough understanding of these benefits and an earnest desire to perpetuate this unity.

Both Union and Management expressly endorse sound business practice. However, they see this practice not so much in terms of the end result as they do the means to achieve that result. Business must, of course, make a profit. That is the primary justification for the business in a capitalistic society. But, the primary means to achieve that profit is people and, according to the Japanese, the well-being of the people is at least equal to, if not more important than, the company profit. It is recognized that the company must stay healthy (and this means produce profit) if the people employed by the company are to sustain their livelihood and the quality of their lives.

Conversely, the company recognizes its absolute dependence on its employees for the high productivity which ensures a dominant position in the marketplace and secures an acceptable profit.

With this understanding and given the inherent Japanese character and "work ethic", both parties pursue an enviable course of mutual cooperation and adjustment to the economic conditions of each year.

These attitudes do not exist simply at the top of the labor/management pyramids, rather they extend throughout the local and national levels of workers, middle-level management and individual company management. The almost universal approval and support of these millions of people has contributed to the resounding success of the labor movement in Japan.

Both management and workers point with pride to the fact that they are "partners", in business to sustain and improve the shipbuilding industry, the particular enterprise, and the welfare of the employees.

The underlying philosophy for this approach lies in the Japanese respect for human dignity and the right of every individual to an acceptable livelihood and security. Seen from this viewpoint, the welfare of employees in all industries is the ultimate objective of business. This, of course, is regarded by most Americans as purest "socialism" and, in fact, Japan is far more socialistic in this practice than the U.S. However, because of the respect for private enterprise and for competition among the large industries, it is perhaps more "welfare capitalism" than "socialism".

On the local levels (i.e. the shipyard level) the labor union is a highly respected and important part of the working environment. The union plays an important role in the day-to-day management of the company in areas of personnel welfare programs, safety programs and labor relations activities. The company's Labor Relations Group is charged with the responsibility for administering and applying the labor agreements within the yard, and for any local-level union negotiations or grievances.

All employees (except managers, staff and engineering personnel) belong to the union, not because of any "closed shop" rules or attitudes, but because it is generally considered unfair (and consequently a "disgrace") to be covered by the union contract and not belong to and support the union. Because all employees belong to the one Shipbuilding Union which covers the entire shipbuilding industry, there is no fragmentation between yard workers. Unlike U.S. yards where each craft is represented by a different union, Japanese workers identify with a single entity representing all crafts. This tends to consolidate the union members and alleviates much of the competition and disagreement between local unions. This situation also encourages unity rather than separatism within the crafts themselves. Japanese workers identify with and show allegiance to the shipbuilding industry, the shipbuilding union and to the company for which they work. This is in contrast to U.S. workers who identify first with their particular craft, the local craft union, the larger national union and then to the company.

Through the achievement of this management/labor "partnership", Japan has greatly reduced the union movement "problems" which plagued the country before and after World War II. The development of the current relationship evolved out of serious labor disputes which occurred shortly before the war (and which were resolved by banning union activity of any kind) and which erupted again after the military restraints had been lifted after the war. This evolution occurred through the development and eventual unification of union movements throughout the country and in the many different industries. Finally, through the unification of several of the predominant factions, a stable national

union movement was formed with several 'sub-tier industry unions at the national level **representing** the members of each industry . Since the formation of this movement, labor problems have virtually disappeared from Japan with no major industrial strikes occurring in the past 15 years. The present national union organization is discussed in the following paragraphs.

6.2 STRUCTURE OF JAPANESE LABOR UNIONS

Figure 6-1 illustrates the various Japanese labor unions on the national , industrial, and company levels. The Japan Confederation of Shipbuilding and Engineering **Workers** Union (Japan ZOSEN JUKI **ROREN**) is the single shipbuilding industry union in Japan. This union represents

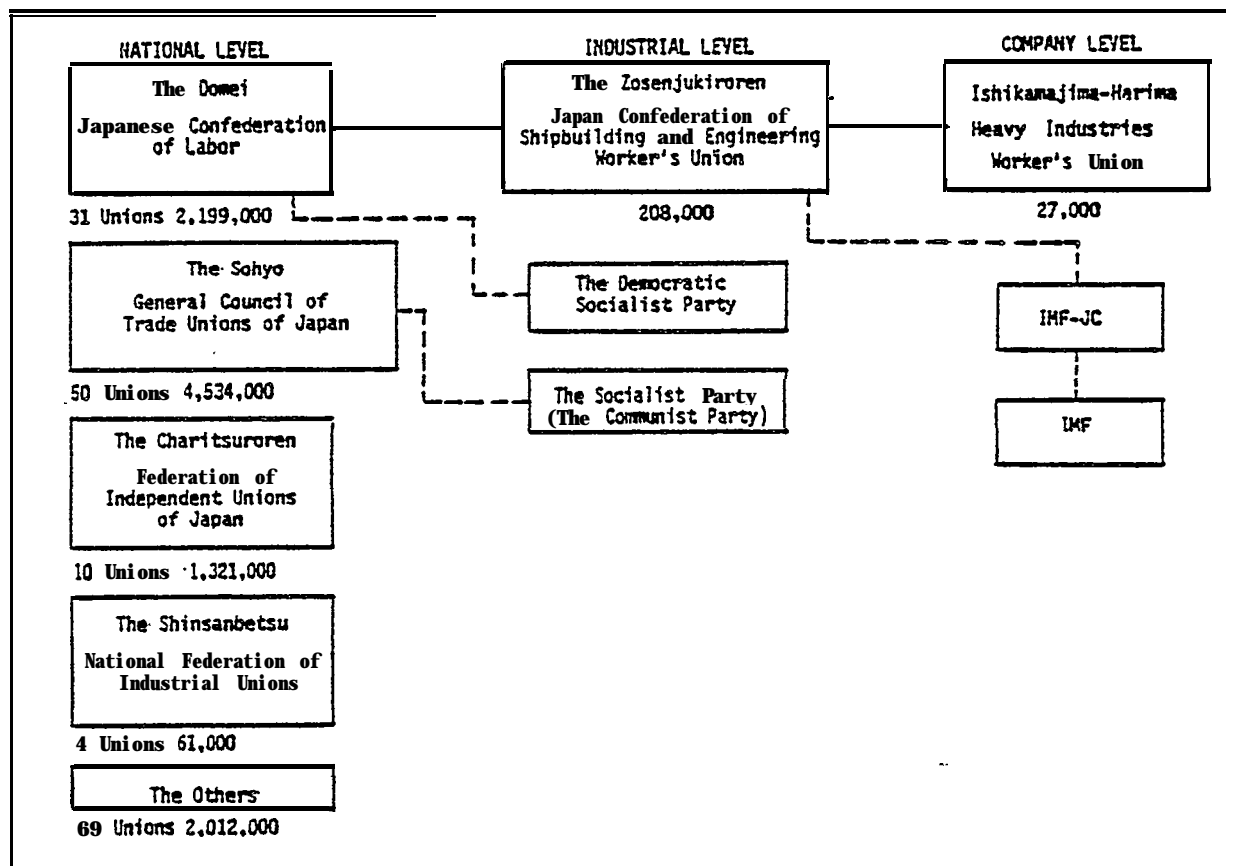


FIGURE 6-1

STRUCTURE OF LABOR UNIONS MOVEMENT IN JAPAN

the workers of all shipbuilding companies and negotiates at the national level with the collective body of companies owning shipyards throughout the country.

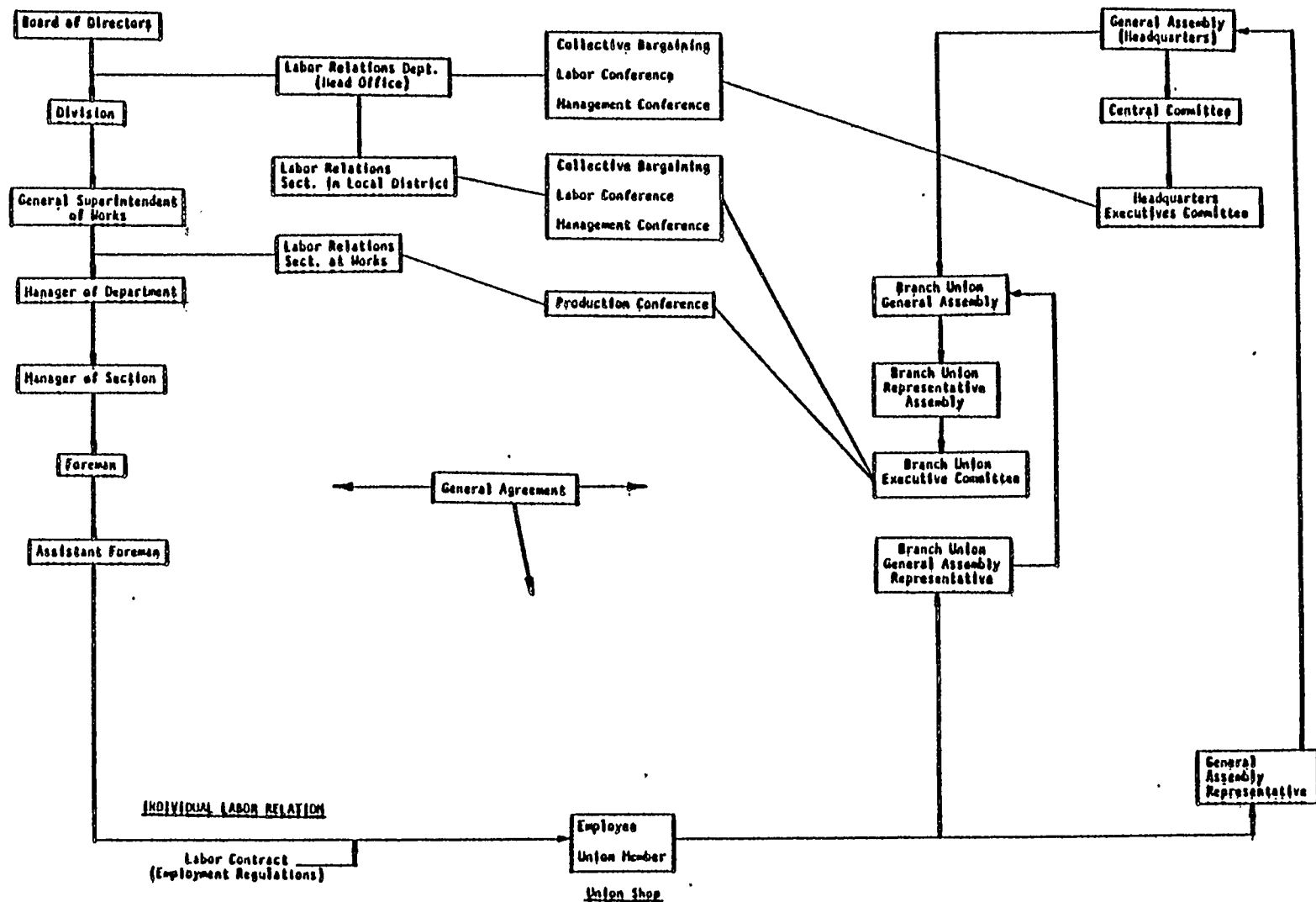
The Shipbuilding Union is tied into the Japanese Confederation of Labor which oversees all union movements in the country and attempts to uniformly develop each sector of union involvement in the society.

Figure 6-2 shows the relationship of the various company and union levels which are involved primarily in yearly negotiations. Many conferences are held each year, in addition to the three distinct negotiating periods (called "struggles") held in the Spring, Summer and Fall. Most of these conferences are held on the local or company level and eventually determine some of the issues to be resolved in the annual negotiations. A listing of these conferences is presented in Figure 6-3.

6.3 ZOSEN JUKI ROREN - JAPAN CONFEDERATION OF SHIPBUILDING & ENGINEERING WORKERS UNION

As mentioned above a single union represents all shipyard workers in Japan. This union is extremely well organized and clearly and unequivocally states its policies and intentions with respect to the employees it represents and the companies with whom it works. Perhaps, the best statement that can be made to explain these intentions is that included in the Inaugural Declaration of the union in 1971:

"We consider that the respect of human dignity is the basis of everything. We firmly adhere to the conception of labour unions based on fraternal love and trust. We aim at the establishment of a modern industrial relationship based on the principle of

COMPANYCOLLECTIVE LABOR RELATIONUNION

	MEMBERS	FREQUENCY	
(1) Labor Conference	M) Manager & Section Manager of Labor Relations U) Executives	Monthly	Matters for
(2) Management Conference	M) Director & Manager U) Representative	Quarterly (Jan, Apr, Jun, Nov)	Management
(3) Works Management Conference	M) General Manager of Works, Manager of District Labor Relations, etc. U) Branch Union Executives	Quarterly	District Ma
(4) Production Conference	M) General Superintendent of Works; Manager concerned U) Branch Union Executives, Shop-Representatives	Monthly	Production
(5) Works Production Conference	M) U) Determined at each District	Determined at each District	Determined
(6) Factory Safety & Health Committee	M) General Superintendent of Works Manager concerned U) Shop Representative	Monthly	Safety and
(7) Shipyard Workshop Safety & Health Committee	M) Manager Section Manager concerned U) Shop-Representative	Monthly	Shipyard Wo Health Matt
(8) Shop Safety & Health Committee	M) Section Manager Foreman Assistant Foreman U) Shop- Representative	Monthly	Shop Safety
(9) Special Safety Committee	M) Representatives U) Representatives	Semi-Annual	Safety Trai

M) Management U) Union

FIGURE 6-3

TYPES OF MANAGEMENT - LABOR CONFERENCE

equality and participation. And we go along the broad highway of free and democratic labour movement which is adapted to the coming new age."

The union also has stated policies regarding the establishment of a "welfare society", safety; raising total annual wages; and a host of benefit and personnel welfare programs.

With regard to its intention for a "welfare society", the union is committed to raising the living standards and the quality of life of the general populace of Japan. This includes finding solutions (or assisting in the solutions) to environmental pollution, inflation and other societal maladies, and the creation of appropriate welfare systems

In the area of safety, the union takes an active role in stressing the need for industrial safety both to its members and to the companies for whom its members work. Safety is generally one of the primary topics at the annual negotiations, and safety programs, conducted in every company, are largely the result of union instigation.

The annual increase of wages is, of course, one of the primary objectives of the union. This is however, based on sound reasoning associated with the increase in the gross national product. These pay increases are expressed in five categories:

1. Maintenance of the level of net wages - which has to do with the cost of living increases witnessed in the economy.
2. Heightening of the level of net wages - i.e. the result of net economic growth and improved productivity must be allocated to all people fairly. Therefore, net wages should be increased correspondingly with the result of net economic

growth and higher productivity.

3. Correcting unfair social and economic distribution - This category treats with the distribution of wealth and efforts to expand consumption through the improvement of national welfare systems and social security systems.

4. Present status and future industry and business prospects- which concerns the economic health of the industry and a prognosis of future prospects.

5. Trend of society in general - This category concerns the appraisal of all of Japanese society and attempts to formulate means to regulate and level wages across different industries. This activity includes communication with all unions and wherever possible negotiations in concert with other industrial unions during the annual "struggles".

In the area of benefits and personnel welfare programs, the union has established a series of "major themes" for the expansion of social or personnel-oriented expenditures. These include:

- a. Housing policies (to provide everyone with a decent home);
- b. Improved living environment (to supply a pleasant environment and a decent community);
- c. Improvement in educational facilities and mitigation of the burden of educational cost (to expand the opportunity to learn and to supply a better education);
- d. Medical security (to give sufficient medical care from cradle to grave);
- e. Security after retirement (to provide those who have

worked with the guarantee of a stable life after retirement);
f. Guarantee that everyone has the opportunity for employment.

6.4 NEGOTIATIONS

Each year three major negotiations are held by the union and the companies involved in shipbuilding. These negotiations are referred to as the yearly "struggles" and are programmed to accomplish definite objectives at each meeting. The Spring Struggle concerns wages and some fringe benefits; the Summer Struggle is primarily concerned with the establishment of the yearly bonus (which is considered by the Union to be a part of the basic wage of each worker); and the Fall Struggle is concerned with yearly labor agreements, improvement of working conditions, and personnel welfare programs. Cost of living increases are negotiated twice a year in the Spring and again in the Summer. Many of these negotiations are conducted through a unified "struggle" of all union-organized industries. Many of the benefits discussed elsewhere in this report are therefore universal throughout Japan.

Before and during negotiations each company has a "Board of Directors" that works directly through a collective bargaining labor council (made up of members of both management and labor) with the Union Headquarters Executive Committee. Negotiations begin at the union headquarters level and filter down to the various district labor section levels in each company. The major issues involving wages, hours, and working conditions are decided at the headquarters level while only those matters of a local nature are considered for negotiation at the district level.

6.5 LOCAL LABOR RELATIONS

On the local company level, union activities are largely carried out by the company's Labor Relations Department. This department is charged with the responsibility to administer the union contracts within the yard and to see that all requirements of the contract are satisfied by the company. In this regard the department is responsible for:

- 1) Application and administration of the union contract to ensure that all problems are solved expeditiously and in a manner not disruptive to the employees or the company;
- 2) Planning and implementation of the various welfare programs;
- 3) Coordinating and advising in the operation of the commissary, the yard hospital, and all employee housing facilities and housing loans;
- 4) Handling of social insurance, public annuities and unemployment insurance;
- 5) Payroll
- 6) Relocation of employees
- 7) Education and training programs

With the exception of the payroll function, the "labor relations" function in IHI is very similar to typical Industrial Relations activities in U.S. firms. Within the Labor Relations Department, in addition to the above activities, there is a Personnel section responsible for the recruitment and hiring of new employees. Each of these Industrial Relations functions has a corresponding function in the IHI Head Office.

SECTION 7

TRAINING

7.1 GENERAL

As in all other aspects of the shipyard, training in IHI is highly Systematized with thoroughly developed curricula and courses for new employees and for further education and refresher courses for those with longer tenure with the company.

Since the curtailment of hiring, brought about by the shipbuilding recession in Japan, almost all apprentice programs have been suspended. However, continuing education of the workforce is considered a vital part of the shipyard process and is inherent in every new shipbuilding program.

In order to fully understand the training programs that have been instituted in IHI shipyards, an overview of the total training program is presented here even though the Apprentice Programs are not now operative.

7.2 NEW EMPLOYEE TRAINING

All new employees are thoroughly trained or indoctrinated into their jobs by means of several structured curricula. New employees are ranked according to the level of education completed and are required to take whichever training program parallels their formal education and the job for which they were hired. The ranking of new employees is accomplished as follows:

1. Middle School (Junior High School) Graduates - Approximately 15 years old
2. High School Graduates - Approximately 18 years old

3. University Graduates

4. Other Persons - Maximum age 30 years old

7.2.1 Middle School Graduates

All Middle School Graduates are initially trained in three basic functions upon entering IHI - welding, gas cutting, and crane signaling. this training is accomplished within the first two to three weeks after hire. A thorough indoctrination in safety is also given all new employees.

Subsequent to the training in welding, burning and crane signaling the employee is assigned to a work group where "on-the-job" training begins. Because of the work group organization and the fact that work groups are relatively permanent and have a fixed location and routine, the integration of new employees is extremely smooth and does not adversely affect the productivity of any single group.

Additional training is provided on a formal basis for new employees depending on job skill requirements. The formal training program for these personnel is divided into a two or four year course as follows:

Two Year Course - Welders

First year - Training school and evening classes.
General and technical education.

Second year - Training within the production
departments in the yard.

At the completion of the course a series of examinations are taken by the apprentice to ascertain his relative skill level.

Four Year Course - Fitters and Welders

First two years - Full-time classes at Prefectural
school - General and technical
education.

Third Year - Full-time attendance divided equally between day school and training school. At the end of the third year a mutual decision is made as to selection of a "trade.

Fourth year - Training within the production department of the yard.

At the completion of the course, a series of examinations are taken by the apprentice to determine aptitudes and relative skill levels.

7.2.2 High School Graduates

As with the Middle School Graduates, High School Graduates are given two or three weeks of basic training in welding, burning and crane signaling. However, this training is a part of a four month training course not nearly as extensive as that given Middle School Graduates. The apprentice course for these personnel is as follows:

First month - Training school, arc welding and gas cutting. At the end of the first month the trade to be followed is selected.

Second and
Third months - Training in selected department followed by selecting a section and job.

Fourth month - Special training within the section for job selected (e.g. welder).

At the end of the course, examinations are taken by the apprentice to determine his relative skill level.

7.2.3 University Graduates

All University Graduates are hired by the Head Office in Tokyo where they spend the initial two weeks of their employment. Upon assignment to a shipyard these employees spend two weeks in the yard training school followed by two months in one of the yard's production

departments. Subsequent to this training the employee is assigned to the shipyard section mutually agreed upon by the employee and the company.

7.2.4 Other Employees

Personnel who do not fit the above categories are given a one-month course in the shipyard training school after which they are assigned to a yard section requiring unskilled or semi-skilled workers.

7.2.5 Shipyard Training School Courses

The shipyard apprentice training school comprises a staff of instructors, lecture rooms and demonstration/practice facilities suitable for up to 60 new employees at any given time. Basically, the courses offered by the training school are welding, gas cutting, and fitting. However, a training course is also offered for Inspectors and Quality Control Engineers.

Typically, the course for welder/fitters includes an apprentice course concerned with arc welding from two weeks to one month; gas cutting for about two to three weeks; and an examination. The employees then attend the Fitting School to receive training in automatic welding, semi-automatic arc welding, submerged arc welding, electro gas cutting, and electro gas arc welding. Actual fitting work is learned on-the-job by trainees subsequent to training school completion. Examinations are given subsequent to each course. Figure 7-L provides a diagram of the course curriculum.

The training for Inspectors and Quality Control Engineers, who are High School Graduates, consists of one month in apprentice training school; two months in training in design, hull construction, hull

TYPICAL WELDER TRAINING SCHEDULE

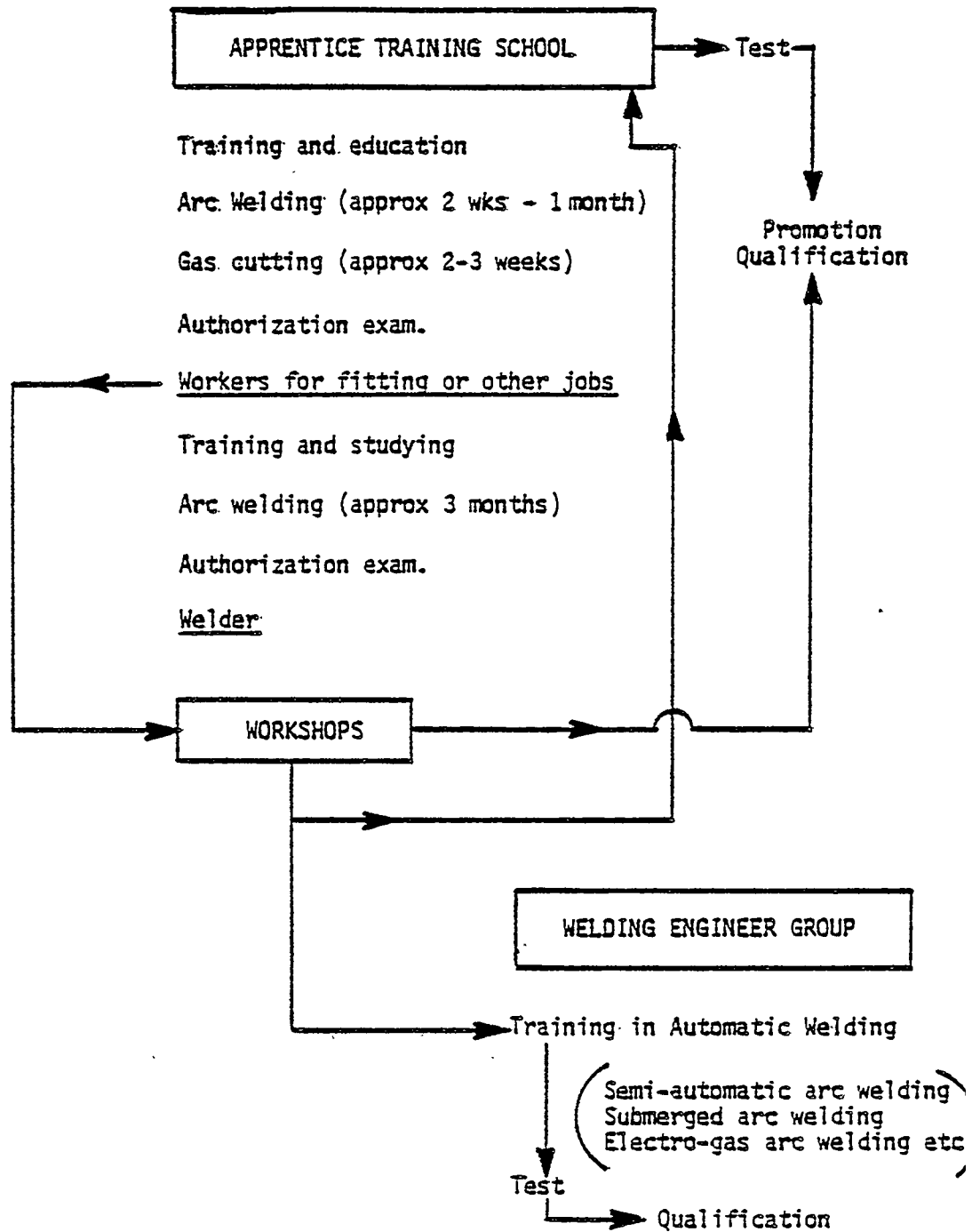


FIGURE 7-1

fitting and paint departments; three months training in an assembly section by a QC member; three months training in an erection section; three months training in a hull fitting section by a QC member; and then assignment to a department. Figure 7-2 depicts the course curriculum for these personnel.

7.3 CONTINUING EDUCATION AND TRAINING

IHI considers that the entire workforce is constantly engaged in a program of continuing education and training which provides increasing opportunity for learning and promotion within the company. The majority of training occurs "on-the-job" through the gradual improvement in knowledge and skills provided by the interaction with one's work group and with the older and more experienced employees. The requirement for training subordinates exists at every level of the organization and this training is carried out assiduously by supervision and management personnel.

This emphasis on education and training is portrayed in Figures 7-3 and 7-4 with regard to both Field (production) personnel and Office and Technical personnel, respectively. This continuing education and training within IHI results in a progressively higher level of competence and efficiency in all employees and, given the long tenure of IHI employees, ultimately provides a workforce of great depth and proficiency.

TYPICAL TRAINING FOR INSPECTORS AND QUALITY CONTROL ENGINEERS
(HIGH SCHOOL GRADUATE)

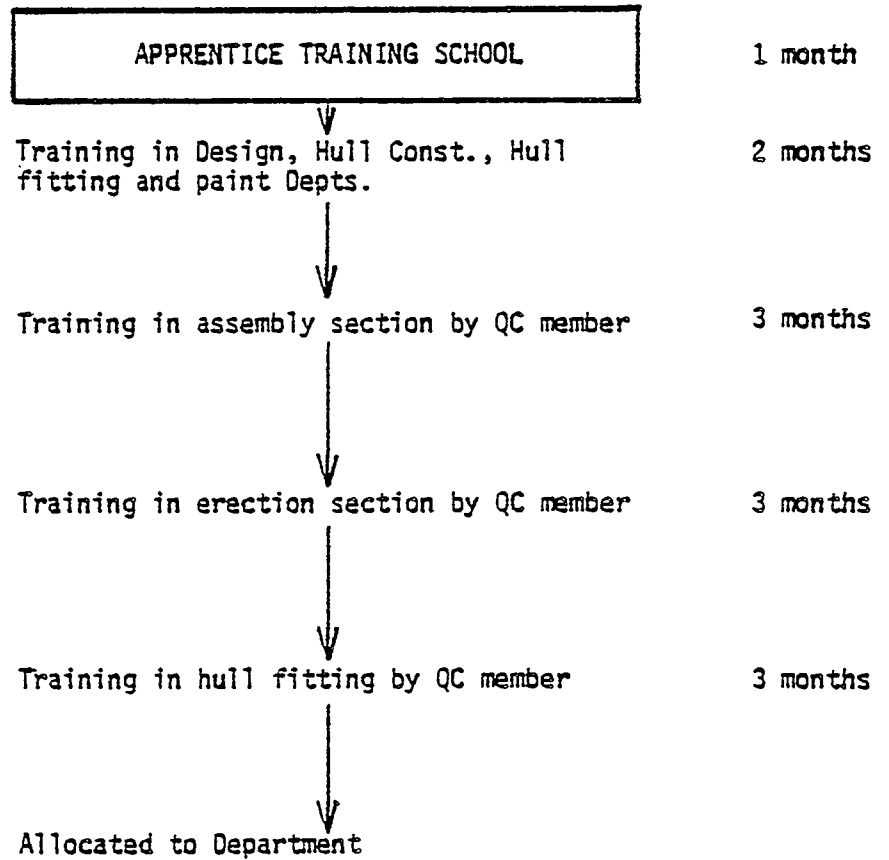


FIGURE 7-2

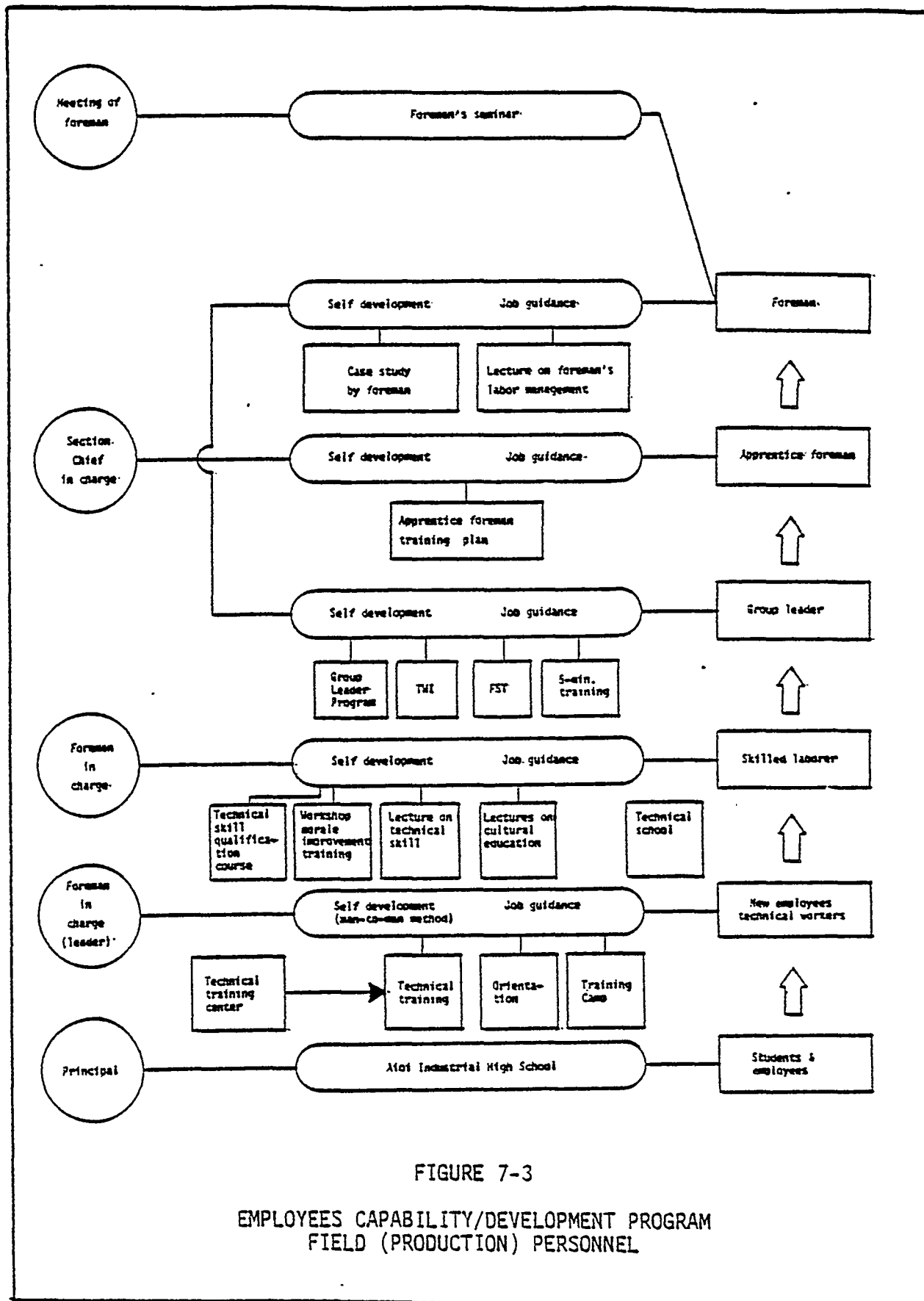


FIGURE 7-3

EMPLOYEES CAPABILITY/DEVELOPMENT PROGRAM
FIELD (PRODUCTION) PERSONNEL

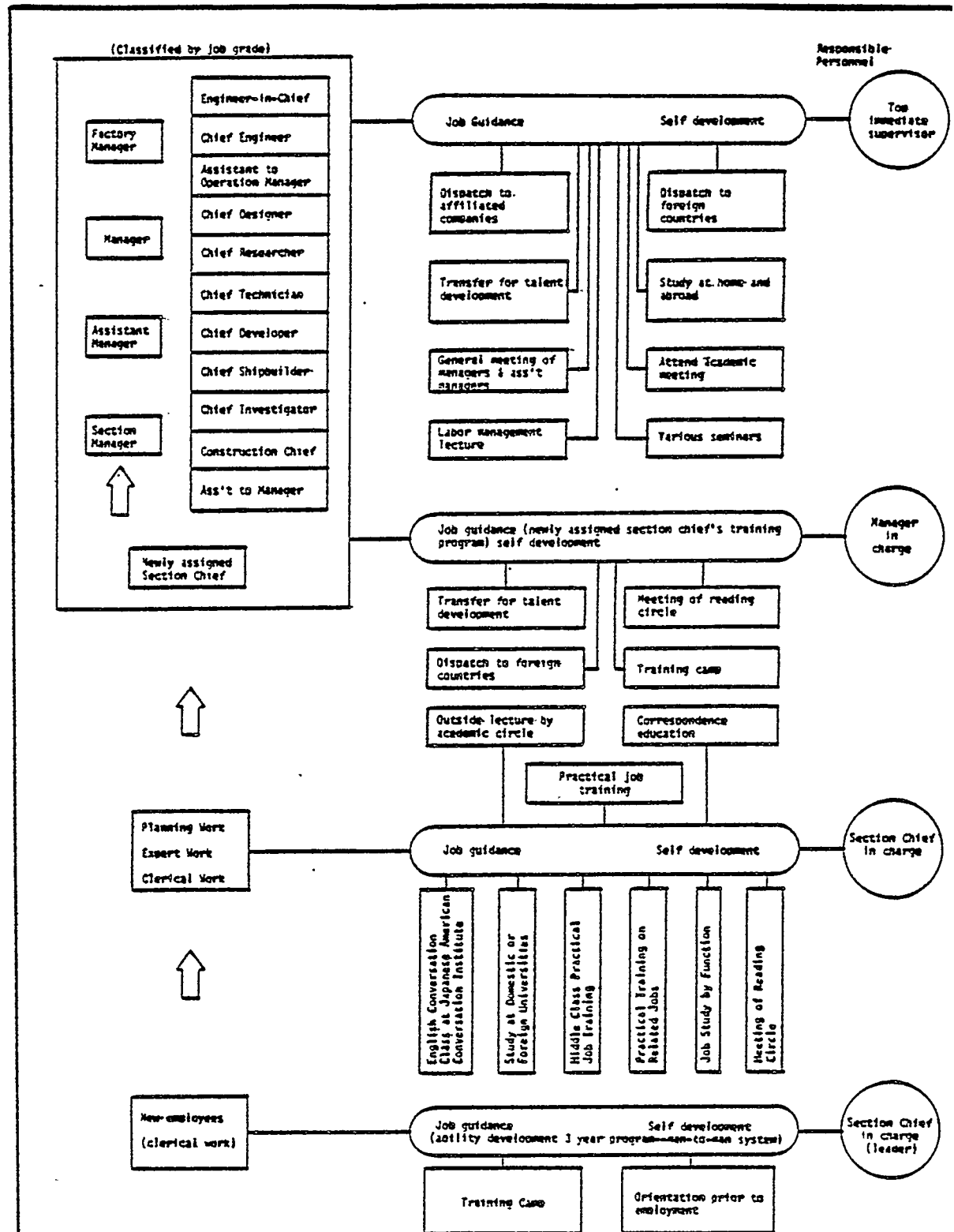


FIGURE 7-4

EMPLOYEES CAPABILITY DEVELOPMENT PROGRAM
OFFICE AND TECHNICAL PERSONNEL

SECTION 8

LSCo. FINDINGS AND CONCLUSIONS

8.1 COMPARISON ANALYSIS

Based on the findings of the LSCo. TTP study team and the observations made during two separate visits to the IHI shipyards, a comparison analysis was made between IHI practices and those of LSCo. This Comparison Analysis is presented in Appendix B.

In the areas compared, several significant differences became apparent which required further analysis to determine: the precise differences; whether the differences were amenable to implementation in LSCo.; and the benefits that could be expected from changes to the LSCo. practice. The areas examined were:

Employee Distribution

Employee Ratios

Age, Tenure and Education

Wages

Benefits

Welfare

Labor Relations

Incentives

Training

Several of the above areas within LSCo. are not immediately amenable to change simply because they are dependent on the current management/union relations extant within LSCo. and are subject to present union contract terms and conditions. These areas are: Labor Relations,

Wages and Benefits.

Also, Age; Tenure and Education are not directly controllable and although these aspects of personnel relations may be influenced by many, if not all, of the other elements of personnel policy and program a company has little direct authority over these factors.

The remaining elements were analyzed (beyond the scope of the comparison analysis) as possible candidates for institution in LSCo.

8.1.1 Employee Distribution and Ratios

A study of the IHI distribution of personnel shows a heavy emphasis on planning and coordinating personnel involved in the production process. The large number of personnel within the Production Planning and Engineering Groups in each of the workshops together with the members of the Material Control and Quality Control groups shows this emphasis within IHI. In terms of ratios, IHI maintains one planner/coordinator for every 16 production workers. This is in contrast to LSCo. which has a 1:29 ratio of staff personnel to production workers.

This heavy application of personnel to the planning and control functions of the yard indicates the distinct orientation of the IHI ship construction system toward thorough and complete planning and scheduling throughout the production process. Although many more personnel are required to accomplish this degree, of planning, it obviously more than compensates for the added people in terms of reduced production manhours and ship construction schedules.

The significant ratios determined during the comparison analysis were those concerned with supervision to worker (1:6.1 for IHI and 1:13 for LSCo.) and direct to indirect employees (4.4:1 for IHI and 4.0:1 for

LSCo.). As seen by these ratios more supervision and indirect employees are assigned in IHI in support of the direct workers. The first ratio is explainable in terms of the high tenure and stability of the IHI workforce, the complete absence of any apprentice personnel entering the IHI shipyards, and the extensive use of workshop staff personnel in planning and coordinating activities.

The second ratio (i.e. direct to indirect employees) is more difficult to analyze and reconcile due to the disparities between the two companies in the definition of "Indirect" personnel. IHI classifies many more and different types of personnel as "Indirect" than LSCo. In fact, all employees except production workers and Assistant Foremen are considered "Indirect" in the IHI accounting system. This classification of such a large number of employees as "Indirect" would lead one to expect a nearly equal ratio between direct and indirect personnel. However, this was not the case when compared to the ratio as it exists in LSCo. As shown above, the ratios are very close with IHI having only slightly fewer indirects per direct worker than LSCo. One explanation for this lies in the fact that IHI uses extremely few clerical personnel compared to typical U.S. yards. The "Indirect" personnel IHI does use are staff personnel used in the planning and coordinating functions directly concerned with the production process. In U.S. yards these personnel are generally considered as direct-charging employees.

8.1.2 Personnel Welfare

It is in this area where the differences between IHI and LSCo. (or most U.S. yards) are most pronounced. This area encompasses the elements of Safety, Sanitation, Environment (working), Employee Facilities

Medical /Dental Care, Employee Relocation and Communications.

Generally, the IHI yards have organized programs and definitive practices well established to provide maximum benefits for the personnel at all levels of the organization. Since these programs are addressed fully in other sections of this report no further description is needed here. However, the comparison analysis shown in Appendix B shows the vast difference in emphasis placed on these personnel-oriented activities by IHI versus LSCo.

These IHI programs and practices are indicative of the management philosophy and objectives established not only by IHI but by the majority of Japanese industry and which contribute significantly to the stability and effectiveness of the Japanese workforce.

8.1.3 Training

In the area of training, IHI has many more formal training programs than LSCo. Also the attitudes of the Japanese toward continuing education and training at all levels of the organization portray a decidedly different perception of the value of training than that common to U.S. yards. This is partially due to the fact that Japanese workers do not change jobs or companies like their American counterparts. Hence any investment in training by a Japanese company will in all likelihood be returned in terms of higher productivity through more thoroughly trained employees. This, of course, is not necessarily the case in American firms.

In the area of Supervisor Training, IHI has a continuing educational process which ensures the training of personnel on-the-job by the next level of supervision management. This process ensures

that all employees are trained to assume the next level of skill. Therefore, new foremen and new managers are always available from the next lower level whenever required for new openings. In IHI this training is consistent throughout the shipyard and therefore requires no formal Supervisor Training school. In contrast with U.S. yards, this IHI system has marked advantages and assures an abundance of trained supervisory personnel at all times.

8.1.4 Productivity Improvement Programs

IHI has instituted a series of programs aimed at the improvement of productivity or the reduction of costs. These programs are discussed elsewhere in this report. The comparison analysis showed a diametric contrast between IHI and LSCo. in this area. According to documented results, IHI has achieved a substantial return *for* the time and money invested in these programs.

8.2 APPLICATION TO U.S. SHIPYARDS

The application of many of the personnel-oriented programs currently in operation in IHI is not only possible in U.S. yards but would undoubtedly contribute significant benefits in terms of workforce stability and improved productivity.

Most U.S. firms do not recognize the inherent business benefits attendant to personnel welfare programs. This is largely due to the fact that any programs attempted by American firms are fragmented rather than a part of a thoroughly planned and consistently executed program which addresses all aspects of employee welfare. The results from such a fragmented approach are usually minimal and ultimately of little benefit. Consequently, pieces of personnel-oriented programs

come and go and never succeed in realizing any long term results.

Another, and perhaps more pervasive reason is that U.S. firms are not basically personnel-oriented. As previously mentioned, the Japanese see the industrial system as the means for achieving a satisfactory and beneficial life for the people **who** operate and sustain the business. This perception of industrial enterprise is far more socialistic in concept than the traditional American viewpoint. However, the "capitalistic" objectives of U.S. firms may be better served by this typical Japanese approach than by the more impersonal and competitive practices commonly employed.

The Japanese are unquestionably concerned with the welfare of all people in all segments of the economy. This concern is a sincere and integral part of the national philosophy. However, the reciprocal of this attitude is an equal concern for the industrial base that provides the wherewithal to achieve that welfare. Therefore, an inherent part of the personnel-oriented industrial system and the personnel welfare programs is the compensatory increases in productivity, workforce stability, explicit allegiance and loyalty to the company, cooperativeness, and eagerness to have the company and its products excel in the world market.

Although U.S. firms may agree with the validity of this approach as sound business practice, many aspects of U.S. business militate against any attempt to apply these ideas in the U.S. Certainly it is improbable that U.S. management/labor union relations will soon approach those of the Japanese. However, they can be vastly improved through the implementation of company-sponsored programs which

obviously benefit union workers. Currently, almost all U.S. benefit programs are initiated by the union and included in labor contracts at the next negotiation. Management typically sees these as "give-away" programs rather than as an opportunity to improve working conditions and productivity. In this type of situation company management loses the initiative to the competitive union leadership and forfeits any possibility of securing a more company-oriented attitude on the part of the workers.

The subjects treated in this **report** all form a pattern of Japan industrial concepts involving people. Indeed the industrial complex in Japan is now almost totally oriented toward elevating the living standards and quality of life of the Japanese people through the successful manufacture and marketing of products throughout the world.

It is impossible to discuss the industrial system without thoroughly defining the personnel system which supports and gives purpose to all Japanese industry. It is equally impossible to separate one element of the personnel system without understanding that it is an integral part of the whole scheme upon which the industrial system is built. The organization and hierarchial arrangement of the individual yards, the distribution of personnel across the various jobs and departments, the wage and salary system, the benefits and welfare programs, the continuing education and training system and the productivity improvement programs all form vital parts of the personnel system and the shipyard production system. The deletion of any individual part degrades the entire production activity and the high level of productivity achieved by these yards.

The Japanese personnel-oriented system is one method for serving the best interests of both workers and management, however, the Japanese concepts of private enterprise differ significantly from those of most U.S. firms. In order to apply the "personnel-oriented" system of the Japanese, an American firm would have to realign not only its way of doing business but its philosophy with regard to the objectives of the enterprise. Profit would have to be relegated to a position subordinate to the welfare of the people of the firm and to the quality of the product. This basic change in philosophy may preclude the successful adoption of the Japanese approach in the minds of many American businessmen.

Aside from this basic philosophical difference, the principal obstacles to the application of the Japanese personnel system to U.S. shipyards are the attitudes extant between management and labor (unions) and the worker attitudes prevalent in American industry. These attitudes can be vastly ameliorated by the introduction of many of the elements characteristic of the Japanese personnel system, however, full implementation of the Japanese system is impossible under the prevailing labor movement precepts in the U.S. In this regard, an attitude of mutual objectives and cooperation, similar to that of the Japanese, would have to develop between American labor and the management of individual firms and eventually of the whole industry.

Irrespective of labor/management attitudes several parts of the Japanese personnel system can be instituted in U.S. yards. For example: the IHI production organization **or** pieces of that organization are amenable to adaptation to a U.S. yard. Those organizational

elements having to do with the production workshops, especially the use of "Staff" groups and the organization into production stages of fabrication, sub-assembly, assembly and erection, are readily adaptable to any shipyard. This would, of course, require a reorganization and re-orientation of the traditional U.S. concepts of Production Planning and Control activities and, if not carefully controlled, could cause some disruption of work in process. If this reorganization was attempted, the Japanese system of planning, scheduling and production control would necessarily have to be at least partially instituted.

In the area of benefits, U.S. firms can initiate some activity aimed at increasing the concern of the company for the employees and, hopefully, improving the image of the company in the eyes of its employees. The reciprocal of this activity would be improved labor/management relations, more identity with and allegiance to the company, and possibly a more stable workforce because of this allegiance. Improved productivity would be a natural by-product of these positive attitudes.

Some of the benefits most amenable to adaptation are: bonus programs. (i.e. congratulatory/condolatory/retirement or possibly incentive-type); longevity pay; improved eating facilities; and provision of work clothing.

Extending these benefits into the area identified by the Japanese as Personnel Welfare Programs, U.S. yards can adopt some of the more intensive safety and sanitation methods; an extensive environment program to improve general yard working conditions; provision of employee recreational facilities; improved in-yard medical and dental care; and other similar programs obviously oriented toward the welfare of the employees.

The addition of productivity-improvement programs within a U.S. yard could have several benefits both for the employees and the company. These programs offer employees a way of participating in the affairs of company management through individual efforts to improve production methods and techniques, to improve the quality of company products, to improve the personnel safety of yard operations, and to assist in the reduction of costs. All of these things obviously yield benefits to the company and when offered to employees on an incentive basis (i.e. awards or bonuses for ideas or performance) create an atmosphere of unity and common objectives throughout the yard.

One of the most vital areas in any business, and one which is especially adaptable to U.S. yards, is that of communication. Production workers often feel bewildered by yard operations simply because they do not understand the overall building process *or* their particular role in that process. The Japanese overcome this through communication of planning and scheduling data to all levels of management and workers. This is accomplished by posting relevant information in each "Work Station" area, such as: Key Event Schedules, "Work Station" schedules, work layout diagrams in each work station, personnel assignment rosters and performance measurement and control graphs. This communication is also accomplished through the continuing education and training program established to familiarize and train all levels of personnel in the intricacies of the production process. This communication allows employees to understand and identify with the overall production activity; identify with a particular element of the production process; understand the movement of material and the flow of the parts and

pieces he has fabricated or assembled; and assess the performance of his individual work station-or group.

If a U.S. yard is organized so that personnel are allocated to a particular work station or work group, this communication is very meaningful to the workers and will instigate initiatives to improve performance, routinize the assigned work to the greatest degree possible, create a unity among the workers. in one station, and create competition among groups at different stations. These initiatives should ultimately result in substantial and continuing increases in productivity:

Finally, the institution of a system whereby workers can be allocated to a fixed work station and work group is an important and achievable aspect of the Japanese personnel system that can be adapted to U.S. yards. This is a difficult and far-reaching undertaking for a yard not already organized by work station (for performance of certain types of work albeit by different personnel). The many benefits deriving from the assignment of permanent work groups to a single location concern employee identity, skills improvement, use of routine or "mass production" techniques, accurate individual and group performance measurement, and the eventual development of firm estimating, cost control, and scheduling parameters. The institution of this "work group" system would require considerable change to traditional centralized planning and control systems, the production/facility system, and the manning system utilized by most yards.

Overall, the adaptation of any of the above personnel -oriented systems **or** practices should enhance U.S. shipyard performance. The institution of any aspect of the Japanese personnel system can yield

positive results in terms of personnel satisfaction with the company, identity with the company, closer cooperation between labor and management and better working conditions and relationships for all personnel. Inevitably these positive elements of corporate or company operations would influence productivity and, over the long term, profitability.

APPENDIX A

EXAMPLE OF IHI WORK RULES

EXCERPT FROM RULE OF EMPLOYMENT

(Preface)

1. This is an excerpt from the IHI Rule of Employment dated December 1, 1960 and revised on June 16, 1976 which are applicable to the alien employees ~~or~~ subcontractor's employees, in accordance with Japanese Law.
2. In case any discrepancies shall arise with respect to the interpretation of the stipulation in this "Excerpt from Rule of Employment", the interpretation based on the original stipulation in Japanese language shall govern.
3. In case any problem shall arise which is not covered by the "Rule of Employment", then the problem shall be settled in accordance with the spirit of the Japanese Law.

Rule of Employment

Chapter 1. General Provisions

(Purpose)

Article 1. This rule shall, in addition to stipulations of relevant laws and regulations and labour agreement, provide for the employment of employees.

(Respect of Personality and General Responsibilities)

Article 3. Employees shall abide by various rules and regulations of the Company, comply with (obey) directions given by supervisors designated by the service regulations, maintain order of the work place and shall cooperate with each other in carrying out of their duties. The supervisors shall respect their employee's personality in the conduct of business.

Chapter 5. Service

(Normal Working Hours. Time of Commencement and Closing of Service, and

Article 14. Normal working hours shall be 9 hours a day, including time for recess. Time for commencement and closing of business shall be as follows, subject to changes required by business operation:

- (1) Commencement of work: 08:00
- (2) Closing of work : 17:00
- (3) Recess : From 12:00 to 13:00

2. Notwithstanding the above, the above time schedule may be provided separately in accordance with the particularity of the office/work.

(Holidays)

Article 15. The following shall be non-working days. (holidays):

- (1) Sundays
- (2) Saturdays
- (3) 1st January Autumn Equinox
 15th January 10th October
 11th February 3rd November
 Spring Equinox 23rd November
 29th April
 3rd May (All above are National Holidays.)
 5th May
 15th September
- (4) 31st December, 2nd/3rd January
- (5) May Day (1st May)
- (6) Summer Holidays (2 days during summer)
- (7) Next day which a national holiday falls on a Sunday

2. The foregoing holidays may be switched **over** to some other days to be determined in-advance-for All or part of employees as the operation of the business may prescribe.

(Overtime and Holiday Work)

Article 16. Without regard to the stipulation of the foregoing Articles, employees may at times be ordered to work overtime or on holidays as required for the operation of the business.

2. If an overtime duty continues all night, the employee involved in such overtime work assignment shall not be required to work continuously on the following day.

(Recess Hours for Overtime and Holiday Work)

Article 17. Recess hours during overtime work shall be as follows:

- (1) From 19:00 until 19:30

(2) From 00:00 until 01:00

(3) From 06:00 until 06:30

2. item No. (1) in the foregoing paragraph shall not be applicable to those employees engaged in overtime work extending until 20:00.

3. Recess hours for holiday working shall be the same as normal working days.

(Suspension of Work)

Article 18. Due to business requirements, etc., all or part of employees may be ordered to be off from work.

(Shift System)

Article 21. The employees may be required to work on shifts as the operation of business may prescribe.

2. The normal working hours, time for commencement and **closing of** work, and time for **recess** stipulated in the foregoing paragraph shall be provided for separately.

(Shifting of Working Hours)

Article 22. Without changing the aforementioned normal working hours, employees may be ordered to work by shifting the commencement and closing work to earlier or later time, due to the particularity of the duty of such employees.

(Emergency/Disaster Service)

Article 23. When temporarily required to do so due to disaster or other compelling cause, the working hours, time for commencement and closing of work and recess time may be changed, and in addition, the employees may be required to work on holidays.

2. For the aforementioned work, the Company may, in advance appoint certain employees for this purpose, the details of which shall be provided separately.

Section 2. Entry, Exit, Late Coming and Early Leaving

(Reporting and Closing Hours)

Article 25. The hours **for** reporting to and leaving from the Company shall be as follows:

Reporting: Within 50 minutes prior to commencement time

Leaving : Within 50 minutes after the closing time

2. Prior approval shall be obtained **in** case any employees are to report to the Company earlier than the time established above or to leave the Company later than the time established as such in the foregoing.

(Late-Coming)

Article 26. Employees who are late for the commencement hour may be admitted into the Company only if the delay in reporting does not extend beyond 30 minutes after the normal commencement time, and such shall be treated as "late-coming". This provision shall not be applicable to such late-comings for which there is a special reason.

(Procedures for Entry and Exit for Reporting, Leaving, Field Trips, Going Out, Late-coming, and Early Leaving)

Article 27. Procedures for entry and exit for reporting, leaving, field trips, going out, late-coming, and early-leaving shall be prescribed separately.

(No Admittance and Dismissal)

Article 28. Those employees who come under any of the following stipulations may not be admitted into the Company or dismissed from the Company:

- (1) Those who carry fire arms, destructive weapons **or** other dangerous object not required for the performance of the work.
- (2) Those who are under the influence of alcohol, or are deemed to be in danger of causing annoyance to others, **or** being injurious to public morals.
- (3) Those who are deemed to be injurious for public health.
- (4) Those who obstruct the operation of the business or disturb the order, or who are deemed to be in danger of being such.
- (5) **Those** who are prohibited from coming to the Company **or** working by laws and regulations or by this Rule.

Section 3. performance of Duties and Discipline

(Regulations concerning Entry to and Exit from Company Premises)

Article 29. The employees shall observe the following regulations when entering into or leaving from the Company premises.

- (1) Not to fail to use the prescribed gate(s).
- (2) To carry identification certificate and wear the Company badge.

- (3) Not to refuse or evade without good reason, inspection of personal effects conducted by the guards.

(Regulations concerning Performance of Services)

Article 30. The employees shall abide by the following regulations in the performance of services:

- (1) To commence working simultaneously with the time of commencement of works and continue-the-performance of the work until the time of closing of business.
- (2) To engage exclusively in the assigned work during the working hours.
- (3) Not to leave the work place unnecessarily during the working hours. When leaving the work place, approval should be obtained from the supervisors.
- (4) To wear the prescribed mark during the working hours.
- (5) To wear suitable working wear during the performance of services.

(Procedures **for** Medical Treatment during Working Hours)

Article 32. When the employees are to receive medical treatment during the working hours, they shall comply with the prescribed procedures. The procedures for the above shall be established separately.

(Responsibility for Maintenance and Improvement of Work Efficiency)

Article 33. The employees shall endeavor to maintain and improve work efficiency in-accordance with the following stipulations:

- (1) To use materials supplies and equipment, power, fuel and other consumable items **in** a rational manner minimizing wastage.
- (2) To operate or handle machines and tools with care, and to report to personnel in charge any trouble, damage or loss at each time such is occasioned.
- (3) To contrive to improve the working method at all times.

(Strict Observance of Business Secret)

Article 35. The employees shall not divulge any business secret regardless of whether or not the secret which may come to their knowledge is directly connected with the work of which they are in charge.

2. Directions as to what should be treated as confidential shall be provided to the employees in advance.

(Regulations for Preservation of Order and Morals)

Article 36. The employees shall comply with the following regulations in order to preserve order and decency:

- (1) Not to force other employee to be absent from work, or come late for work, or to leave work earlier.
- (2) Not to engage in gambling, to derange or to corrupt the morals, to sell or to buy goods, or to conduct any act similar to such, within the premises-of the Company.
- (3) Not to use the Company property **for** private purpose, and not to make or to cause to make any personal articles within the premises of the Company.
- (4) Not to entrust others or to be entrusted by others with the stamping of "time card".
- (5) Not to scribble on the buildings, facilities, materials, products, etc., of the Company.
- (6)** Not to take out the Company properties without permission.
- (7) Not to conduct any act of violence, menace, injury, or insult, or to interrupt the conduct of business within the premises of the Company.
- (8) Not to hold meetings, to deliver speeches, to print and to distribute **or** to display any printed matters, within the premises of the Company or of the Company facilities, without approval of **or** against the directives of the Company.
- (9) Not to conduct any political **or** religious activities which may disturb the morals or lower the efficiency of the employees within the premises of the Company or its facilities.
- (10) Not to wear any backnumbers, or any sort of signs which have no relationship to the employees' duties without permission from the Company, in the premises of the Company.

(Interviews)

Article 37. Unless specially approved, all personal interviews shall reconducted during the recess hours.

2. Such interviews as are referred to in the foregoing should be conducted in the place designated for such purpose.

Section 5. Non-Attendance and Leave

(Non-Attendance)

Article 41. In the event that an employee intends to be absent from work because of injury, illness **or** other compelling cause he shall notify his supervisor of the same through prescribed procedures. However, when it is impossible for him to do so under circumstances not permitting him so to do, he shall notify his supervisor promptly *expost facto*.

2. In case of non-attendance due to injury or illness, the employees shall apply for permission for leave with a medical certificate issued by a doctor.

Chapter 8 Safety

(General Rules Concerning Safety)

Article 50. Employees shall act upon directions given by safety supervisor, safety committee and other personnel concerned, shall observe safety rules, rules relevant to accident prevention and cautions, and must endeavor to achieve and maintain safety of the work place.

(Rules Concerning Safety)

Article 51. Employees shall, in addition to the foregoing, observe the following:

- (1) To check, prior to commencement of work, with no fail, all prime movers, power transmission devices, installed machineries and tools with which work is performed. When abnormality is found in any of this equipment, to stop use of such equipment, to immediately report such finding of abnormality to supervisor and to act upon direction as will be given by the supervisor.
- (2) Not to fail to use protective device. Especially, to wear safety helmets in designated places and to use safety belts at high working places.
- (3) Not to dismount safety device without permission and not to lead such device to lose its efficiency.
- (4) Any employees other than operators in charge shall not start **or** stop prime movers.
- (5) Not to get on or ride, without permission, on the building, installations, raw materials, chimney or crane.
- (6) Not to perform cleaning **or** repair of machineries while operating.

- (7) Not to use any fire in the open air, **or** electric heaters, etc. , without permission.
- (8) To wear prescribed safety shoes during work in case engaged in handling heavy matter, or continuously dangerous work.
- (9) Not to smoke in any place other than designated area for smoking.
- (10) To be cautious when handling fire or inflammable goods. Such inflammable goods shall be stored or disposed of so as to be free from danger. In case of handling such goods prohibition of entry to work plats by outside people must be clearly put in notice.
- (11) To endeavor to keep **work** place clean and arranged in order at all times, and not to leave any goods in passage, emergency exit and places adjacent to fire-fighting equipment.

(First Aid Kit)

Article 51. All employees must be aware of location of first aid kit and its usage necessary for first aid to person injured.

(Emergency and Natural Disaster)

Article 52. When an employee or employees find occurrence or outbreak of fire or other emergency state or natural calamity, danger or other abnormality, such employee or employees shall immediately take necessary counter-measures and immediately report such occurrence to his or their supervisor and act upon directions given by the supervisor. In case of such a state of emergency, all who are aware of such a disaster shall make utmost efforts in the spirit of cooperation to minimize damages from such suffers.

(Safety Training)

Article 54. Employees shall receive a safety training established by the Company.

Chapter 9 Heal th

(General Rules Concerning Heal th)

Article 55. Employees shall act upon directions given by health supervisor, health committee and other personnel concerned, shall observe rules and cautions concerning health, and must endeavor oneself for sanitation in the place of work.

(Restriction of Work)

Article 56. Any employee falling under any one of the following shall not be permitted for work, with the exception of employee falling under (2) who has been immunized or treated for prophylactic from communication of such diseases.

- (1) Those who suffer from recurrent fever, measles, anthrax, glanders or other similar infectious diseases.
- (2) Those who suffer from diseases of possible dissemination of infection such as tuberculosis, syphilis, ascariasis and other cutaneous diseases, pyogenic conjunctiva, trachoma of very possible contagion or those who are afflicted with contagious eye diseases, or those who have pathogenic organ of contagious or infectious.
- (3) Those who suffer from schizophrenia, manic depressive, dementia paralytic, and other mental disease and who are deemed incapacitated for work.
- (4) Those **who** suffer from pleurisy, tuberculosis, heart trouble, beriberi, arthritis, infiltration on sheath of denden, acute urinal and genital organ diseases, and other similar diseases and who have doubt of taking worse turn by continuing the work.
- (5) Those **who** suffer from contagious or infectious diseases or serious illness and not yet completely recovered from such diseases **or** illness.
- (6) Those who suffer from diseases correspond to all of the foregoing.
- (7) Those who are deemed incapacitated for work by a doctor or doctors appointed by the company.

(Responsibility for Reporting Concerning Health)

Article 57. Employees shall report any fact of affliction by himself, any one of the members of his family or lodger, on contagious or infectious diseases or suspicion thereof, to his immediate supervisor without delay from occurrence of such diseases.

(Health Training)

Article 60. Employees shall receive health training as will be conducted by the Company.

Chapter 12 Disciplinary Action

(Discipline)

Article 69. Employees shall not be punished for delinquency in any reasons other than specified below:

(Penalties)

Article 70. Penalties shall be as follows:

- (1) By admonition and written explanation.
 - (2) Restriction of Annual Leave:
By restriction of number of annual leave to number of non-legalized days, after admonition.
 - (3) Reduction in Salary:
After admonition, wage to be deducted by an amount equivalent for one half day of an average wage at one time of penalty or its total to be within one tenth of gross wage **for** one pay period as applicable.
 - (4) Suspension from Work:
After admonition to suspend from work for 10 calendar days and withhold payment of wage for such period of suspension.
 - (5) Disciplinary Discharge:
To immediately dismiss without notification period.
2. Disciplinary action shall be taken by issuing a written notice and shall be posted to the public if deemed necessary.
 3. In case the employee's misconduct is minor, or in extenuating circumstances, reclaiming is recognized to be great, disciplinary action may be alternated with only warning.
 4. In case of admonition, further penalties will be imposed upon if there is any refusal of submitting written explanation.

(Claims for Damage)

Article 71. If there are any damages **or loss** to the Company resulting from the violation of the Rules by the employee, the Company may claim for compensations of the damage affected against the employee or his warrantor in addition to the disciplinary action provided in this chapter.

(Prohibition from Work)

Article 72. When misconduct by an employee which applies to disciplinary discharge is found, the employee may be prohibited from reporting

for work until a disciplinary action is determined.

(Admonition)

Article 73. Except in the cases where employee's conduct falls under Article 76 and Article 77, when an employee violates the company's regulations, instructions and notices without reasons, he shall be admonished. Considering the circumstances, however, the employee may only be cautioned.

(Suspension from Work, Reduction in Wage and Restriction of Annual Leave Privilege)

Article 74. When an employee falls under any one of the following, the employee shall be given a disciplinary action of suspension from work, reduction in wage **or** restriction of annual leave privilege. In consideration of circumstances, however, the employee may only be admonished.

- (1) When the employee's misconduct of the preceding article exceeds twice or more, or when the circumstances of such misconduct is found to be serious.
- (2) When the employee refused check of personal belongings by security guard.
- (3) When the employee did not obey instruction of prohibition from admission and dismissal as provided for in Article 28.
- (4) When one employee forced other employees to be absent from work, late coming and early leaving.
- (5) When an employee conducted gambling, corruption of public morals and order, selling and buying of goods or other similar conducts, at the company premises.
- (6) When stationaries, materials or goods of the company is put to a private use, or produced or repaired personal goods within the company premises.
- (7) When an employee entrusted for stamping time records **on** time cards or was entrusted and did the same.
- (8) When an employee scribbled on the building, installation, materials, or products of the company.
- (9) When placed a poster or notice or painted out posters and notices without reason.
- (10) When an employee caused disaster, injury or other accident due to his negligence in performance of work or supervision of employees.

- (11) When employees had a quarrel at the premises of the company.
- (12) When misconduct of impropriety corresponding to any of the above was found.

(Disciplinary Discharge)

Article 75. When an employee falls under any one of the following, the employee shall be discharged for discipline. In consideration of circumstances, however, this penalty may be alternated with suspension from work or reduction in wages.

- (1) When misconduct of any of the preceding article exceeded twice or more, or when such circumstances of misconduct were found to be serious.
- (2) When an employee refused, without reason, order of transfer to other place of work or reclassification in job title.
- (3) When an employee engaged in **or secured** position of employment or official of other companies without permission, or when engaged with business against beneficiary of the company.
- (4) When let out the company's **sacret, or** when found to have intended same.
- (5) When removed properties of the company without permission, or when found to have intended same.
- (6) When conducted an unauthorized meeting, speech, distribution of documents and printed matters within premises or facilities of the company.
- (7) When corrupted public morals or conducted a political activity to deteriorate work efficiency within the premises or facilities of the company.
- (8) When found to have been employed through False personal history **or other** means of fraudulence.
- (9) When inflicted a loss upon the company through false statement.
- (10) When intentionally planned disadvantage to the company or when found to have tried.
- (11) When damaged or abandoned, intentionally or by **gross** negligence building, facilities, supplies and equipment, products and other goods of the company.
- (12) When acted a violent threat, bodily injury and insult, or hampered the business transactions of the company.

- (13) When obstructed the work efficiency intentionally.
- (14) When disobeyed orders given by supervisor-or slandered employment system of the company.
- (15) When propagated groundless reports which induce disadvantage to the company, or when spreaded uncooperative speeches and conducted to disturb normal business operations or found to have intended to do same.
- (16) When frequently left from work place or office by stating false reasons without permission of his supervisor.
- (17) When reporting is unsteady, **or**when not diligent in performing one's duties.
- (18) When non-attendance without notice shall continuously take place for 14 days or more without due reason.
- (19) When unduly received **or** gave away money, articles or other benefits, in relation to one's duties.
- (20) When unduly used the money of the Company.
- (21) When committed **or**intended to commit theft robbery of other's property.
- (22) When violated and guilt is evident.
- (23) When worn in the premises of the company backnumbers or any sort of signs which have no relationship to the employee's duties, without permission.
- (24) when refused to take advice of personnel concerned in maintenance of safety and sanitary without reason.
- (25) When misconduct of inpropriety corresponding to any of the above was found.

(Instigation, Abetment, Group Delinquency)

Article 76. In case of instigation or abetment of others to act as stipulated in Article 75, 76 and 77, same disciplinary action will be accorded.

- 2. **In** case of group delinquency, the abettor shall be punished heavier than other members of the group.

APPENDIX B

INDUSTRIAL RELATIONS COMPARISON ANALYSIS

IHI (AIOI) VS. LSCO (ORANGE)

APPENDIX B

INDUSTRIAL RELATIONS COMPARISON ANALYSIS

GENERAL

This appendix presents a comparison analysis of industrial relations data describing the Aioi shipyard of IHI and the Orange shipyard of LSCo. The statistics are presented and discussed in each of nine categories, as follows:

<u>Section.</u>	<u>Subject</u>
B-1	Employee distribution
B-2	Employee ratios
B-3	Age, tenure and education
B-4	Wages
B-5	Benefits
B-6	Welfare
B-7	Labor Relations
B-8	Incentives
B-9	Training

The IHI data used in this analysis were generally obtained directly from IHI in July, 1979, and were current at that time. Some additional data were obtained from the Japanese Confederation of Shipbuilding and Engineering Unions and are not all as current as the IHI data: the different data **sources are** indicated in the analysis.

The LSCo data used in this analysis were current at the time of writing, that is, at the end of February, 1980.

Although there is a six-month difference in the validity of the two sets of data, they are nonetheless comparable. IHI's data are still valid and wage rates are still current. LSCo's data are even more suitable for comparison

than they would have, been if July, 1979, values had been used, because throughout the period since March, 1979, LSCo's workforce has been growing and gradually approaching its optimum, evenly-distributed level.

B. 1 EMPLOYEE DISTRIBUTION

Table B-1 shows the employee distribution in each shipyard by department and by function. The department and function categories are IHI's: the LSCo figures have been manipulated to provide the necessary comparability. LSCo's Production Planning and Control department, for example, has been spread through a number of categories, as appropriate: so has LSCo's Industrial Engineering department. LSCo's ship repair and maintenance activities draw personnel from a number of production departments in addition to those **of** the Ship Repair and Maintenance departments, while in IHI this is only true of maintenance: the LSCo figures shown in this table for ship repair are therefore the average manning for each activity, regardless of department, while for maintenance they are only the figures for the maintenance department. Some considerable amount of judgment has been used to allocate numbers of personnel from LSCo's craft-oriented departments to IHI's process-oriented classification: this was easier in some areas, such as welding, where LSCo's welders are already assigned by process, than in others, such as pipefitting, where the division of labor between processes is not yet fully defined. Lastly, some adjustments have been made to reflect the fact that several LSCo departments are also serving other LSCo divisions or are performing functions that in IHI are provided for the Aioi shipyard by their head office.

In reviewing these figures, several key observations arise:

IHI's new construction tonnage throughput is roughly four times LSCo's and their productivity is roughly three times LSCo's: it would be expected, therefore, that their new construction workforce would

be about 1.3 times LSCo's, and this expectation is confirmed.

In hull construction, (the steel trades), IHI's direct workforce is only 1.2 times LSCo's, while in outfitting it is 1.6 times, reflecting IHI's much greater productivity in steelwork relative to outfitting

IHS's steel trades are proportionately heaviest in erection, while LSCo's are heaviest-in assembly, reflecting LSCo's greater scope for improvement in assembly techniques.

The ship repair figures are not directly comparable because of the great difference in facilities and in types **of** customers.

In the indirect functions, the biggest difference is in engineering: the size of the Aioi engineering staff is startling considering their much greater use of standard designs: even though it is 3.6 times LSCo's, this is still not out of line with the difference in output between the yards.

The remaining significant difference is in the last three lines: . it takes 60% more people to manage the U.S. yard than it does the Japanese yard.

TABLE B-1

FUNCTION	WORKERS		ASSISTANT FOREMEN		FOREMEN		STAFF		MANAGERS		TOTAL		REMARKS
	I H I	LSCo	I H I	LSCo	I H I	LSCo	LSCo	LSCo	III	LSCo	III	LSCo	
HULL CONSTRUCTION	944	790	129	51	33	10	40	29	7	10	1,153	890	
-Fabrication	214	157	28	9	7	3	6	9	1	2	256	100	Depts. 5 & 11
-Assembly	228	362	26	24	6	4	5	3	-	2	265	395	75% Dept. 4 & 60% Dept. 6
-Erection	284	163	44	12	9	2	4	1	1	2	342	100	25% Dept. 4 & 40% Dept. 6
-Transportation	162	108	22	6	8	1	5	2	1	1	198	110	Dept. 13
-Planning/Control/Management	56		9		3	-	20	14	4	3	92	17	Dept. 10 elements of Depts. 20 & 25
OUTFITTING	532	300	114	18	36	7	53	9	10	7	745	349	
-Module Outfitting	80	40	79	3	6	1	5	1	1	1	119	46	Depts. 7, 8 & 9
-Onboard Outfitting	37	27	10	2	4	1	6	-	1	1	58	31	Depts. 7, 8 & 9
-Deck Outfitting	124	40	26	3	8	1	8	-	1	-	167	44	Depts. 7, 8 & 9
-Accom. Outfitting	131	40	24	3	8	1	4	-	1	1	168	45	Depts. 9 & 10
-Electrical	91	20	19	1	4	1	9	-	1	1	124	23	Dept. 12
-Painting	51	141	13	6	5	2	10	1	1	1	80	151	Depts. 1 & 2
-Planning/Control/Management	10		3		1		11	7	4	2	29	9	Dept. 19 elements of Depts. 20 & 25
TOTAL NEW CONSTRUCTION	1,476	1,098	243	69	69	17	93	30	17	17	1,898	1,239	

EMPLOYEE DISTRIBUTION

TABLE B-I.

FUNCTION	WORKERS		ASSISTANT		FOREMEN		STAFF		MANAGERS		TOTAL		REMARKS
	III	LSCo	III	LSCo	III	L S C o	III	LSCo	III	LSCo	III	LSCo	
SHIP REPAIR	581	257	114	14	28	3	52	2	12	9	787	285	
-Hull	240	133	55	4	9	1	9		1	1	315	139	LSCo Depts. 3, 5, 6
-Machinery	189	28	29	1	9	-	10	-	1	-	238	29	LSCo Depts. 7, 8, 9, 10, 12
-Painting	22	28	7	2	2	-	3	-	1	-	34	30	LSCo Dept, 2
-Docking	109	68	21	7	6	2	3	-	1	1	140	78	LSCo Depts. 1, 13
-planning/Control/Management	21	-	2	-	2	-	27	2	8	7	60	9	
INDIRECTS	71	89	16	13	6	3	446	230	19	25	558	360	
-Maintenance and power	44	52	7	4	3	-	20	5	2	1	76	62	LSCo Dept. 23 elements of Dept. 20
-QA		-	.				38	20	5	1	43	21	LSCo Dept. 15
-Engineering			.				279	76	1	1	280	77	LSCo Dept. 14
-Material Control	26	23	9	3	-	2	15	13	1	2	51	43	LSCo Depts. 22 and 25-3
-Purchasing						.	20	11	1	2	21	13	LSCo Dept. 26
-Estimating and Sales	1	-	-	-	-	-	12	12	2	3	15	15	LSCo Depts. 27 and 28
-Production Control					-		6	19	1	5	7	24	LSCo Dept. 29 elements of Depts. 20,25, and 30
-Labor Relations		14	-	6	3	1	18	25	2	1	23	47	LSCo Dept. 31
-Adminstration	-	-		-	.		38	46	2	4	40	50	LSCo Depts. 32, 33, 34, 35
-Management	-	-			-	-	-	3	2	5	2	8	LSCo Dept. 30
GRAND TOTALS	2,128	1,464	373	96	103	23	691	270	48	51	3,243	1,904	

EMPLOYEE DISTRIBUTION

B.2 EMPLOYEE RATIOS

Table B-2 shows a number of employee ratios for each yard.

The first three ratios shown are measures of the degree of supervision provided to the workers in each shipyard, the first including only first-line supervision, the second including the next level also and the third including departmental management. Clearly, IHI requires its supervisors to manage only half the number of workers that LSCo does, even though the IHI worker is generally better-trained, better-educated and less in need of supervision than most LSCo workers. It is notable also that IHI supervises outfitting more closely than steel while at LSCo it is the other way around.

There are two modifying factors to these ratios. IHI has been reducing its workforce in recent years, partly by attrition and partly by transfer: it can therefore be expected that they would have more supervisors than in a normal steady-state condition. Conversely, LSCo has been increasing its workforce rapidly in recent months and the appointment of supervisors has definitely lagged behind this growth: the normal LSCo third-level supervisory ratio is about 10 to 1.

IHI regards shipbuilding as essentially a welding process and their scheduling is designed to get maximum productivity from their welders. The next two ratios are measures of their success in this regard. The fourth ratio on Table B-2 is that of fitters to welders and the fifth is that of all other new construction workers (excluding fitters) to welders.

all hull workers to all outfit workers: IHI's ratio is 1.8, while LSCo's is 2.4. This was reflected also in Table 8-1: IHI has 1.2 times as many construction workers as LSCo but 1.6 times as many outfitting workers.

The extent to which IHI supports its production workers with staff personnel is evident from the seventh ratio shown on Table B-2. In total IHI has one staff engineer for every 15.9 workers, compared to one for every 29.4 at LSCo. At IHI, moreover, these staff personnel are all qualified engineers, while the LSCo numbers include a number of purely clerical help. It is notable that the ratios for staff support of the hull department are much closer (23.6 and 27.2) than for the outfitting department (10.0 and 36.4).

The eighth ratio on Table B-2 is intended to reflect the degree of training undertaken at each shipyard but in each case there are special circumstances that complicate the comparison. Three ratios have therefore been calculated for each yard. The first is the theoretical number of workers per apprentice assuming a steady-state operation with a steady flow of apprentices entering the shipyard at age 18 and working to retirement. At IHI, this would result in a ratio of 9.0, since there is a 4-year apprenticeship and retirement age is 58. At LSCo the ratio would be 22.5, since their apprenticeship is for two years and retirement age is 65. These numbers are somewhat artificial, however, since not everybody works through to retirement. It is much more accurate for IHI than LSCo, since IHI's employees have an average longevity of 17 years. *More* realistic ratios for each yard are probably about 8.0 and 11.0.

The third figures shown are the current actual numbers. IHI's ratio is infinity because they no longer have any apprentices, having stopped all hiring over four years ago. LSCo's ratio is, by contrast, unusually low because LSCo has been systematically training new workers and building

workforce for the past twelve months.

The last ratio shown on Table B-3 is a measure of indirect support for production activity in each shipyard. IHI has 2.9 direct workers (including assistant foremen) in new construction and ship repair, for every other employee: LSCo has 3.3. This seems to indicate that LSCo has a much more streamlined operation, but this conclusion is not really valid, because of the impact of IHI's unusually large engineering staff. When the engineering departments are excluded, the ratios are 4.4 and 4.0. Thus the two operations are reasonably comparable.

TABLE B-2

CRITERION OF EVALUATION	UNIT OF MEASUREMENT				LSCo			REMARKS
		HULL	OUTFIT	TOTAL	HULL	OUTFIT	TOTAL	
FIRST-LINE SUPERVISION	WORKERS PER ASS'T FOREMAN	7.3	4.7	6.1	15.5	10.2	16.2	1:Theoretical level (steady-state) 2: Probable normal level 3:Current actual level 1:Including engineering 2: Excluding engineering
SECOND-LINE SUPERVISION	WORKERS PER ASS'T FOREMAN AND FOREMAN	5.0	3.5	4.7	12.9	13.1	13.0	
TOTAL SUPERVISION	WORKERS PER ASS'T. FOREMAN, FOREMAN & MANAGER	5.6	3.3	4.5	11.1	10.2	10.9	
WELDING/FITTING	FITTERS PER WELDER	5.0	-	-	1.7	-	-	
WELDING SUPPORT	OTHER WORKERS PER WELDER (NEW CONSTRUCTION)	-	-	6.2			2.7	
HULL/OUTFIT	HULL WORKERS PER OUTFIT	-	-	1.8	-	-	2.4	
STAFF SUPPORT	WORKERS PER STAFF ENGINEER	23.6	10.0	15.9	27.2	36.4	29.4	
TRAINING ACTIVITY	WORKERS PER APPRENTICE			9.0 ² 00 ³	-	-	22.5 ¹ 11.0 ² 4.4 ³	
INDIRECT SUPPORT	DIRECT WORKERS & ASS'T.FOREMEN PER OTHER WORKER			2.9 ¹	-	-	3.3 ¹ 2	

EMPLOYEE RATIOS

B.3. AGE, TENURE AND EDUCATION

This comparison is intended to show the type of person working for each company. In general, older, longer-serving and better-educated employees are more productive than the rest. Table B-3 tabulates these factors for each shipyard: the age and tenure values are accurate, but the education values are approximations.

Clearly, IHI's workforce is older, more experienced and better-educated than LSCo's. This seems to be a direct result of the Japanese system which encourages both education and longevity. Note that IHI's workforce has a mean age and tenure of 38 and 20 years assuming that they work from the age of 18 to the age of 58: their actual average age and tenure are remarkably close to these figures. LSCo's mean age and tenure are 41 and 23 years, assuming that LSCo's workers work from 18 to the age of 65, but the actual averages come nowhere near these means, reflecting the high rates of turnover prevalent in the U.S. industry.

With regard to educational levels, there is little difference apparent in the numbers. There is a significant difference, however, in the type of education. IHI's college graduates all attended technical and engineering colleges, mostly specializing in naval architecture, marine engineering or some other shipbuilding-related subject. LSCo's college graduates, in contrast, have studied a wider variety of subjects, not all of which have

TABLE B-3
AGE, TENURE AND EDUCATION

<u>ITEM</u>	<u>IHI</u>	<u>LSCo</u>
<u>AGE</u>		
Average Age	37 years	34 years
Mean Age	38 years	41 years
<u>TENURE</u>		
Average Tenure	17 years	5 years
Mean Tenure	20 years	23 <u>years</u>
<u>EDUCATION</u>		
Senior Management	100% college	100% college
Middle Management	100% college.	40% college 60% high school
Staff	10% college 60% high school 30% junior high school	10% college 50% high school 40% junior high
Foremen and Assistant Foremen	60% high school 40% junior high school	50% high school 50% junior high
Workforce	10% high school 90% junior high school	10% high school 60% junior high 30% lower level

B . 4. WAGES

Table B-4 presents a comparison of each shipyard's average direct wages, including premiums, overtime and bonuses. The values for IHI have been escalated from the figures provided to LSCo in July, 1979, to allow direct comparison with LSCo's figures which are those in effect at the end of February, 1980. IHI values are also shown in both yen and dollars. The exchange rate used was ¥ 248, which was valid at the end of February, 1980. Fluctuations in the exchange rate have a noticeable impact on this comparison. At the time this Technology Transfer Program was initiated, the exchange rate was about ¥ 190: at that rate IHI's direct wage rate would **now** be worth \$9.32/hour, 13% greater than LSCo's.

There are two substantial differences between the two shipyards. Firstly, IHI pays lower overtime rates, but works much more overtime. The rates are lower because overtime is rarely worked on weekends and is mostly in the form of an extended shift. Overtime is used extensively by IHI as a technique **for** maintaining the schedule: it is easy to extend a shift, even at short notice, because IHI works only one shift per day. At LSCo, in contrast, extending a shift is not easy because of conflicts with the second shift and overtime is often worked at **weekends**. The high cost of overtime in a U.S. yard inevitably discourages its use.

The second major difference is IHI's use of the bonus, which is negotiated annually, separately from the basic wage negotiation, and is paid in two semi-annual lump sums. Since the bonus amounts to one-third of the basic wage and hence almost a quarter of total income it is clearly something that workers depend on, creating a powerful obligation on employers to pay it and eliminating the essential character of a true bonus; i.e., something extra that is paid only in successful years. Japan's shipbuilding unions take the position that the bonus represents "deferred wages" and should amount to the equivalent of

five months' regular wages.

In sum, IHI's wages are directly comparable to LSCo's, with exchange rate fluctuations allowing a variation in the equivalent dollar value of total average rate at IHI of $\pm 15\%$ of the total average rate at LSCo.

TABLE B-4

WAGES

<u>ITEM</u>	<u>IHI</u> ¥	<u>IHI</u> \$	<u>LSCo</u> \$
<u>BASE</u>			
Basic Average Rate	¥1247/hour	\$5.03/hour	\$7.91/hour
<u>PREMIUMS</u>			
Premium Rates	None	None	\$0.30/hour (sh \$0.50/hour (di
Effect on Average Rates	None	None	\$0.12/hour
<u>OVERTIME</u>			
Overtime Rates	130% after 8 hours 160% after 10-1/2 hours		150% after 8 h 150% on Saturd 200% on Sunday 200% on holida 5 hours/month
Average Hours/Month	15 hours/month		
Effect on Average Rates	¥113/hour	\$0.46/hour	\$0.23/hour
<u>BONUSES</u>			
Average Bonus Rate	¥ 811,385/year	\$3,272/year	None
Effect on Average Rates	¥ 410/hour	\$1.65/hour	None
<u>TOTAL</u>			
Average/hour	¥ 1,770	\$ 7.14	\$ 8.26
Average/day	¥ 14,160	\$ 57.12	\$ 66.0
Average/week	¥ 70,800	\$ 285.60	\$ 330.40
Average/month	¥ 292,050	\$1,237.60	\$ 1,431.7
Average/year	¥ 3,504,600	\$14,851.20	\$ 17,180.80

8.5. BENEFITS

Benefits are defined in this study as those features of the employer-employee contract that have a direct monetary value to the employee, generally through being paid when not actually working, or are directed at the employee alone. Welfare, the subject of the next section, is defined in this study as those features of the employer-employee relationship that either have no cash value to the employee or are aimed more at the general well-being of the employee and his family than are benefits alone.

Table B-5 presents the principal benefits at each shipyard, in summary form.

IHI's benefits are clearly more generous than LSCo's, in almost every category. As a rough approximation, the cost of IHI's benefits and of the welfare programs listed in the next section must amount to the equivalent to about \$3.00 to \$3.50 per hour, while LSCo's cost roughly \$2.00 to \$2.50.

The principal conclusion to be drawn from this comparison is that IHI clearly regards the money it spends on these benefits as money well-spent, contributing as it does to the stability and morale of their workforce.

TABLE B-5

BENEFITS

<u>ITEM</u>	<u>IHI</u>	<u>LSCo</u>
VACATION	14 to 20 days	5 to 20 days
HOLIDAYS	18 days	12 days
MARRIAGE ALLOWANCE	¥ 35,000 5 days' leave	1 day's leave
BIRTH ALLOWANCE	¥ 5,000 5 days' leave	Nothing
DEATH IN FAMILY	¥ 30,000 7 days' leave	1 day's leave
TRAVEL EXPENSES	Commuter ticket or mileage allowance	Nothing
MID-DAY MEAL	At cost. of materials	Nothing
LONGEVITY PAY	Complex system based on employee's age	\$0.50/hour extra after 18 months
LONGEVITY AWARDS	Every 5 years starting at 20 years' service	Every 5 years starting at 10 years' service
SAFETY AWARDS	Nothing	Monthly lottery if safety goal reached
SAFETY EQUIPMENT	Provided	Provided
WORKING ENVIRONMENT	Close attention to safety, sanitation, aesthetics	Adequate, but much less thorough
UNOFFICIAL BREAKS	Two, 10-mins. each	Time allowed for clean-up, etc.
RETIREMENT	¥ 8,385,250 minimum (1978)	Pension plan

B. 6. WELFARE

Table B-6 presents the principal features of the welfare program at each shipyard, in summary form.

The differences between the two shipyards shown on Table B-6 are even more startling than those in the previous section. The conclusion is the same as in the previous section: the contribution that these programs make to the stability, security and well-being of the workforce, and hence to each worker's motivation and productivity, is substantially greater than their cost.

It should be noted, moreover, that there is not a single program listed on either Table B-5 or Table B-6 that a U.S. shipyard could not introduce if it wanted. Nor are any of them beyond the means of U.S. shipyards. Taken together and all implemented at once, they would, of course, require a disproportionately large investment, but no one program is particularly expensive and there is no reason why a U.S. shipyard should not plan to introduce the entire range, taking the individual programs one by one or spreading their introduction over ten years or even more.

TABLE B-6

WELFARE

<u>ITEM</u>	<u>IHI</u>	<u>LSCo</u>
HOUSING	Provided for short-term, if needed: low-interest loans for house purchase	Nothing
DEATH OF EMPLOYEE	¥ 200,000	\$9,000 life insurance
UNEMPLOYMENT	¥40,000/month	Federal insurance
SCHOLARSHIPS FOR CHILDREN OF DECEASED OR UNEMPLOYED	¥ 15,000/month (over 18) ¥ 10,000/month (under 18)	Nothing
HEALTH INSURANCE	Insurance coverage	Insurance coverage
MEDICAL ASSISTANCE	Full doctor and dentist service at shipyard	First aid only
STORM DAMAGE TO HOME	Paid for	Nothing
RETAIL SALES	Company co-op	Tools, working clothes, company products only
TUITION ASSISTANCE	Paid	Paid
RECREATION	Extensive facilities provided by company: stadiums, pools, etc.	Nothing directly provided by company: employee-funded recreation association subsidized by company.

B. 7. LABOR RELATIONS

The Japanese shipbuilding unions have grown and developed over the years and relations with the employers' associations have not always been as amicable as they now are. This spirit of co-operation, in fact, is one of the more recent positive developments in the Japanese shipbuilding industry and it is not necessarily to be assumed to be a permanent feature of the industry. The recent bankruptcy and closure of more than forty small shipyards must have put some strain on management - labor relations and the recent industrial action by the workers at Sasebo indicates that even the larger yards are not immune.

IHI is the second largest shipbuilding company (after Mitsubishi) and the twentieth largest industrial corporation in Japan. Although shipbuilding is still its major activity, ship construction now accounts for about one-third of IHI's total workforce and only 15% of its total sales. The point here is that IHI has both the alternative activities in which it can absorb excess shipbuilding personnel and the financial resources to absorb the high costs of relocation, early retirement bonuses, lost efficiency, etc. As a result, IHI's relationship with the Japan Confederation of Shipbuilding and Engineering Workers Unions has remained cordial and co-operative.

Table B-7 presents some of the principal characteristics of the labor-management relationship in each shipyard. There are some significant differences.

The Japan Confederation of Shipbuilding and Engineering Workers Unions represents all the direct **workers** in 48 companies, including all the eight major shipbuilders. Total representation is about 207,000 and total membership is about 190,000, 92% of representation. By contrast, workers at Kawasaki are represented by eight different unions and membership is only 45 to 50% of those represented.

The stated goals of the Japanese and U.S. unions are very similar in philosophy and even wording. Differences lie more in the means used to attain those goals.

The Japanese union negotiates with representatives of all the employers three times a year in what are known as the "struggles", an **extremely** emotionally-loaded word. They negotiate wages each spring, bonuses each summer and other-agreements each fall. LSCo's unions negotiate once every three years and determine a complete wage-and-benefit package for the next three years at a single session. The effect of having eight separate unions is substantially reduced by their willingness to negotiate a single agreement, working as a trades council, although this arrangement is not necessarily permanent. This difference is clearly in LSCo's favor, since it makes the company better able than IHI to predict its labor costs.

Relations between management and unions are co-operative and friendly in both shipyards. This is not, however, the case in all Japanese ~~or~~ in all U.S. shipyards. Several Japanese shipbuilders have strained relations with the unions, particularly those companies having difficulty adopting to the industry's depression. In the U.S. most shipbuilders and many unions still have a 19th-century attitude of "us against them" and industrial disputes and strike action are common.

TABLE 8-7LABOR RELATIONS

<u>ITEM</u>	<u>IHI</u>	<u>LSCo</u>
Number of Unions	One	Eight
Representation Membership	207,000 workers 92%	480,000 workers (approx) 45 to 50%
Goals of Unions	<ol style="list-style-type: none"> 1. Fair labor standards 2. Prosperity of members 3. Growth of the union 4. Growth of union movement 5. Strengthening of labor - management relations 6. Improvement of working conditions 7. Stabilization of industry 8. Strengthening of labor union movement 9. International cooperation 10. Support for Democratic Socialist Party 	Similar Similar Similar Similar Similar Similar Similar Similar ----- -----
Negotiations	Three times a year - spring: wages - summer: bonuses - fall: other agreements	Once every three years
Regular Meetings		
-with management	Monthly	Monthly
-with IR personnel	As required	As required
Attitudes	Co-operative	Co-operative

B.8. INCENTIVES

Table B-8 presents the principal incentive programs in effect at the two shipyards. A comparison is difficult since none of IHI's three programs have counterparts at LSCo and LSCo's one program has no counterpart at IHI.

The programs themselves were described in full in the body of the report (Section 2-5).

TABLE B-8

INCENTIVES

<u>PROGRAM</u>	<u>IHI</u>	<u>LSCo</u>
<u>Suggestion/Award</u>		
Cost per Year	¥ 100,000,000 approx.	Nothing
Savings per Year	¥ 250,000,000 approx.	comparable
<u>Zero Defects</u>		
Cost per Year	Very small	Nothing
Savings per Year	Not measurable	comparable
<u>Indirect Cost Reduction</u>		
Cost per Year	Very small	Nothing
Savings per Year	¥ 125,000,000 approx.	comparable
<u>Safety</u>		
Cost per Year	Nothing	\$ 50,000
Savings per Year	comparable	\$250,000

B. 9. TRAINING

Table B-9 summarizes the training procedures used in each shipyard. These are described in greater detail in the body of this report (Section 7).

There is one simple conclusion. IHI's personnel are better-trained than LSCo's from the day that they first enter the shipyard and they never cease to be expanding their knowledge throughout their working lives, whether through on-the-job experience or through an astonishingly comprehensive range of internal and external training programs. While the costs must be considerable, the benefits are obvious.

TABLE B-9

TRAINING

<u>PROGRAM</u>	<u>IHI</u>	<u>LSCo</u>
Apprentices (entering from school)	Fitters: 3 years at training school, 1 year on-the-job Welders: 1 year at training school, 3 years on-the-job	Two years on-the-j part-time at local technical school part-time at shipy training school.
Technical High School Graduates	Four-months general training course.	No training.
University Graduates	Three-months general training course.	No training.
Unskilled workers	One-month general training course.	No training.
Inspectors and QC Engineers	One-year course.	No training.
Continuing Education	Continuous at all levels: extensive use of local technical high school	No training.
Supervisors	Assistant foreman and foreman training programs	No formal training part-time study encouraged.
Staff and Management	Extensive internal and external programs, including transfers and overseas assignments.	Rotation through shipyard departr